Groundwater Remediation Systems

Quarterly Operations Report

July 1, 2019 through September 30, 2019

Brookhaven National Laboratory
Upton, Long Island, New York

Prepared by:

Brookhaven National Laboratory
Environmental Protection Division

Upton, N.Y. 11973

Prepared for:

U.S. Department of Energy
Brookhaven Site Office

December 2019

BROOKHAVEN
NATIONAL LABORATORY

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Table of Contents

Section 1

System Operations Overview 3rd Quarter 2019

Table 1 – Summary of Operations						
Operable Unit System	***Type***	***Target Contaminant***	***Number of Wells***	***Years of Operation***	***Run Time For Quarter (%)***	***Pounds VOCS Removed (Quarter/Cum)***
Operable Unit I						
South Boundary	Pump and Treat (AS)	VOC	2	Operate- 16 Standby- 6	Closure Approved 9/19	0 369
Operable Unit III						
South Boundary	Pump and Treat (AS)	VOC	8	22	95%PP	1 3,053
HFBR Pump and Recharge	Pump and Recirculate	Tritium	4	Operate- 9 Standby- 13	Closure Approved 3/19	NA 180
Industrial Park	Recirculation/ In-Well (AS/Carbon)/ Pump and Treat (Carbon)	VOC VOC	7 2	Operate- 16 Standby- 4 Operate -4	Standby Standby	0 1066 0 10
Building 96	Recirculation Well (AS/Carbon)	VOC	4	Operate- 15 Standby- 3	95%	0.6 143
Middle Road	Pump and Treat (AS)	VOC	7	18	95%	6 1283
Western South Boundary	Pump and Treat (AS)	VOC	6	17	60%	2 155
North Street	Pump and Treat (Carbon)	VOC	2	Operate – 11 Standby - 4	Standby	0 342
North Street East	Pump and Treat (Carbon)	VOC	2	Operate – 10 Standby - 5	Standby	0 44
LIPA/Airport	Pump and Treat (Carbon)	VOC	10	15	100% PP	4 466
*Industrial Park East	Pump and Treat (Carbon)	VOC	2	Operate- 5 Standby- 4	Dismantled	NA 38
Chemical Holes	Pump and Treat (IE)	Sr-90	3	Operate - 15 Standby- 1	Standby	NA
BGRR/WCF	Pump and Treat (IE)	Sr-90	9	14	100% PP	NA
Freon	Pump and Treat (AS)	Freon-11	1	Operate – 4 Standby – 3	Standby	0 106
Operable Unit VI						
EDB	Pump and Treat (Carbon)	EDB	2	15	66%	NA**

AS = air stripping
IE = ion exchange
EDB = ethylene dibromide
NA = not applicable
PP = system is pulse pumping
* Dismantlement of the Industrial Park East system was completed in 2013.
** EDB has only been detected in the influent at trace levels, just above standard, therefore no removal is reported.

Section 2

Q3-2019 Operations Summary
OU I/RA V South Boundary Pump & Treat System
(System Closed)

Process: Groundwater extraction and air stripping treatment, with discharge to the RA V recharge basin

Goal: Reach Maximum Contaminant Levels (MCLs) in core monitoring wells within 30 years for the Upper Glacial aquifer (by 2030). The Petition for Closure of the OU I South Boundary Groundwater Treatment System was approved by the regulators in September 2019.
Note: Current Landfill monitoring well data is included in the attached data tables since this is one of the sources of the OU I/RA V plume.

Start Date: January 1997

Table 2-1
OU I South Boundary Pump & Treat System
Pumping Rates (gpm)

Extraction Well	EW-1*	EW-2*
Site ID #	115-27	115-43
Screen Interval (ft bls)	150-190	104-124/134-154
Desired Rate (GPM)	0	0
July	Off	Off
August	Off	Off
September	Off	Off
Actual (Avg. over Qtr.)	Off	Off

* The system was shut down and put in standby mode in July 2013.

Figure 2-1
OU I South Boundary Pump & Treat System
Cumulative Mass Removal VOCs vs. Time

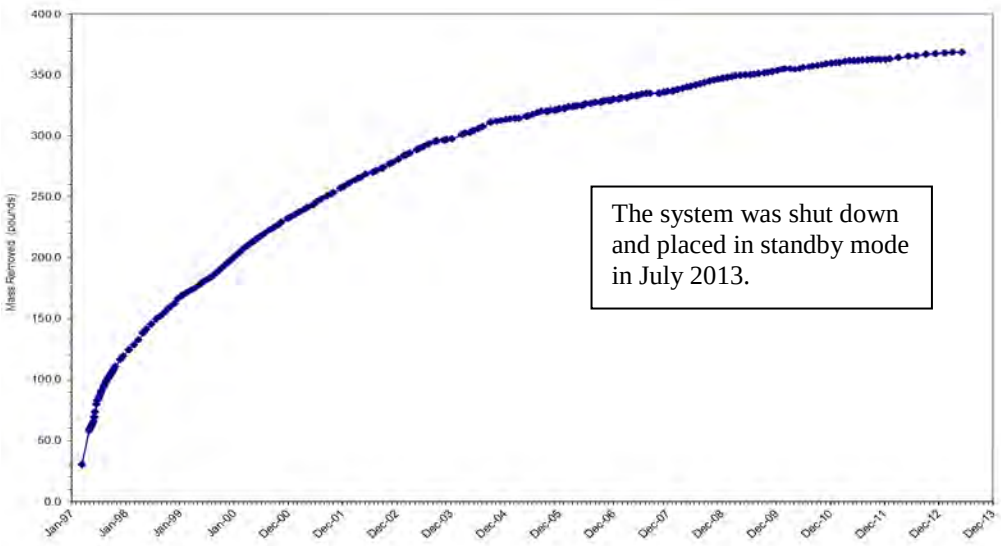


Figure 2-2
OU I South Boundary Pump & Treat System
Influent TVOC Concentrations vs. Time

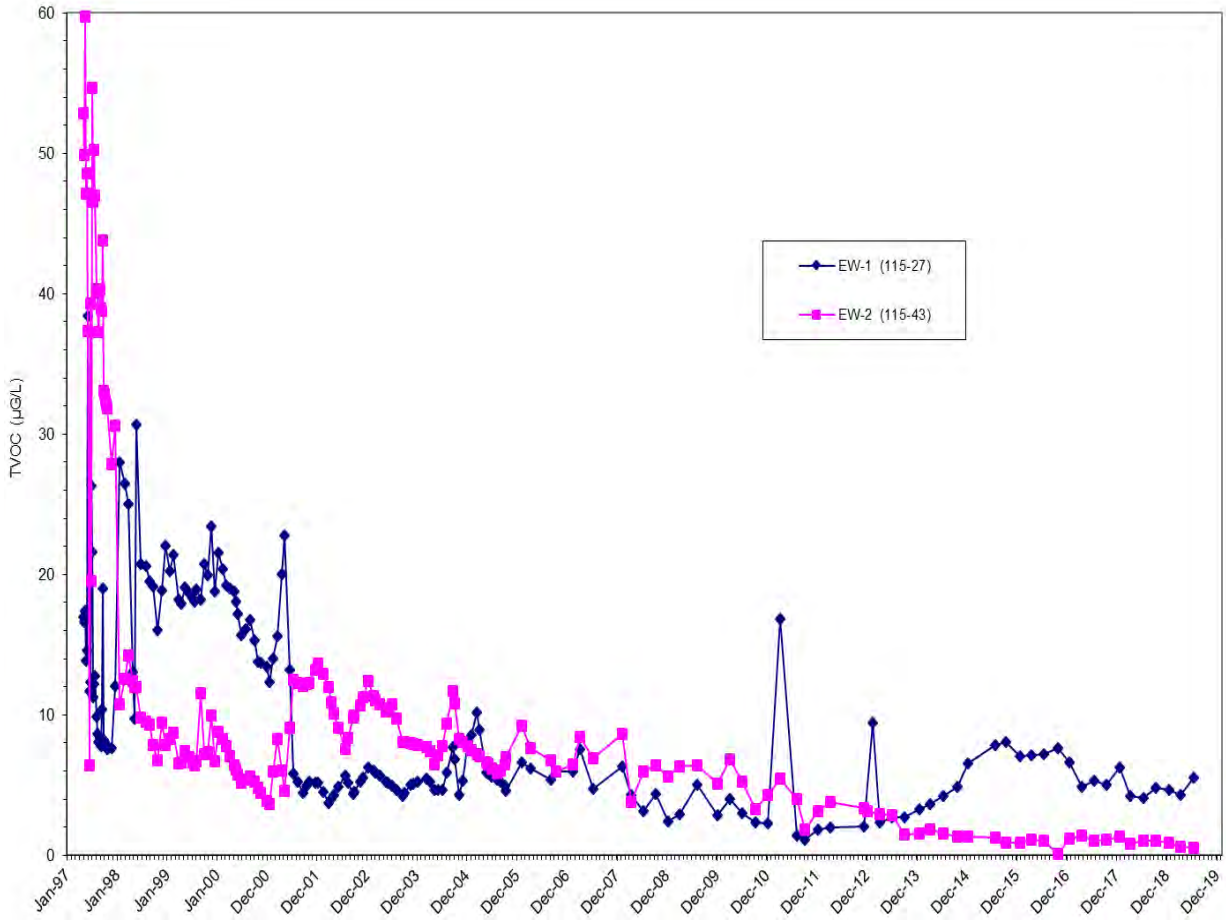


Table 2-2
Effluent Water Quality
SPDES Equivalency Permit Concentrations July 1 through September 30, 2019

Parameter	Permit Limit	Max. Measured Value	Units	Frequency
Flow	Monitor	NA [1]	GPD	Continuous
pH (range)	6.0- 9.0	NA	SU	Weekly
Benzene	0.8	NA	ug/L	Month
Chloroform	7.0	NA	ug/L	Month
Chloroethane	5.0	NA	ug/L	Month
1,2-Dichloroethane	5.0	NA	ug/L	Month
1,1-Dichloroethene	5.0	NA	ug/L	Month
1,1,1-Trichloroethane	5.0	NA	ug/L	Month
Carbon Tetrachloride	5.0	NA	ug/L	Quarterly
1,2-Dichloropropane	5.0	NA	ug/L	Quarterly
Methylene Chloride	5.0	NA	ug/L	Quarterly
Trichloroethylene	5.0	NA	ug/L	Quarterly
Vinyl Chloride	2.0	NA	ug/L	Quarterly
1,2-Xylene	5.0	NA	ug/L	Quarterly
Sum of 1,3 and 1,4-Xylenes	10.0	NA	ug/L	Quarterly

[1] The system is in stand-by mode and did not treat any water this quarter.

System Operations

July 2019:

The system remained in standby mode.

August 2019:

The system remained in standby mode.

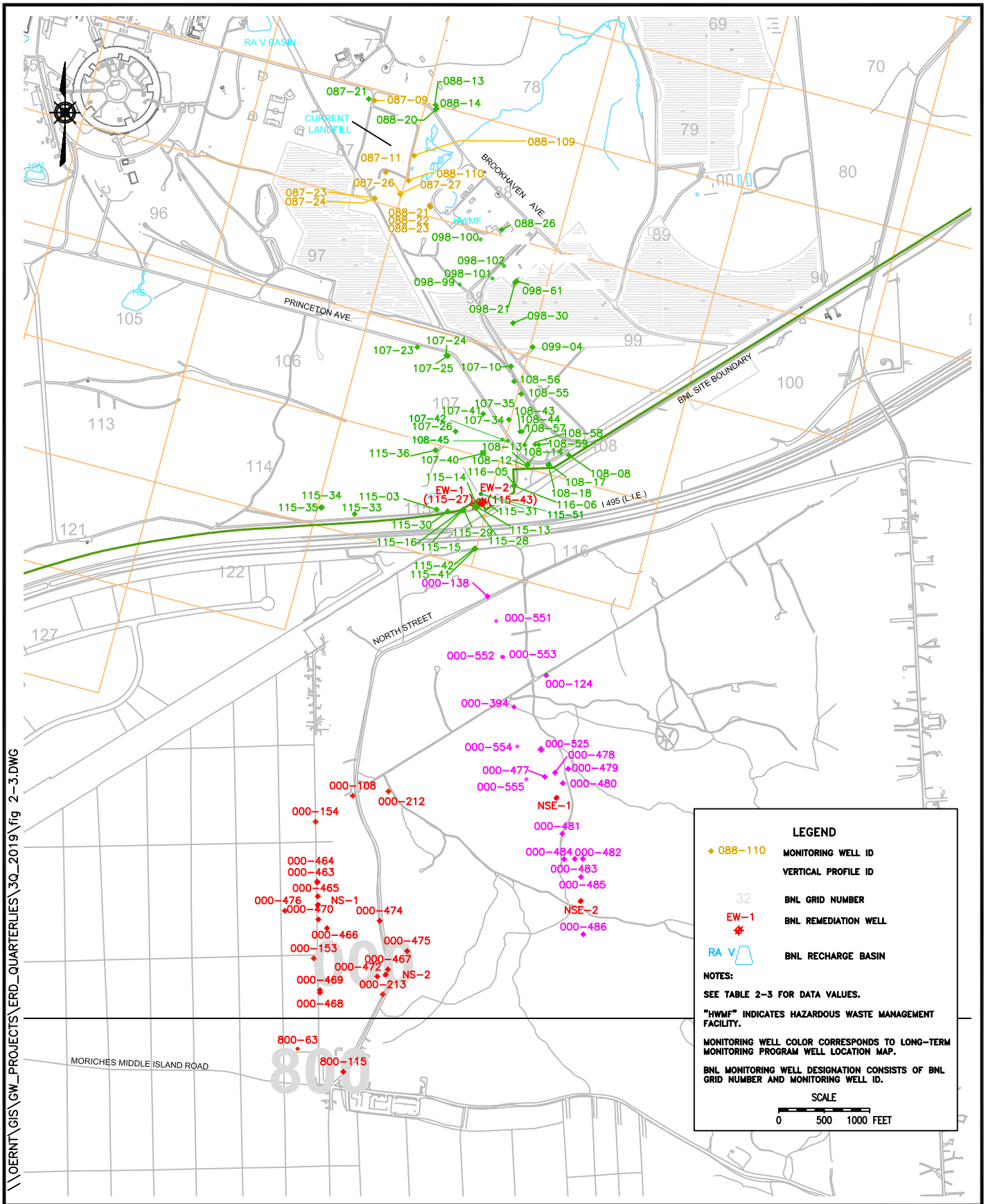
September 2019:

The system remained in standby mode.

In response to the Petition for Closure of the OU I South Boundary Groundwater Treatment System, approval was received from NYSDEC and EPA in August 2019 and September 2019, respectively that the system met its cleanup goals.

Planned Operational Changes

- The maximum TVOC concentration in a plume core monitoring well during the third quarter was 21 µg/L in Current Landfill well 088-109. The maximum TVOC concentration in the extraction wells was 6 µg/L in EW-1 in the third quarter. Sampling of the extraction wells will be discontinued in October 2019.
- In October 2019, install three shallow monitoring wells to provide permanent monitoring points at the locations where the highest Sr-90 concentrations were observed in and adjacent to the former source at the FHWMF.



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BROOKHAVEN NATIONAL LABORATORY

ENVIRONMENTAL PROTECTION DIVISION

TITLE:

OU I SOUTH BOUNDARY/NORTH STREET/NORTH STREET EAST MONITORING WELL NETWORK

SITEWIDE REMEDIATION SYSTEMS
THIRD QUARTER 2019 OPERATIONS REPORT

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
JEB	–	08/08/11	NA
CHKD:	APPD:	REV.:	NOTES:
RH	--	11/18/19	–

FIGURE NO.: 2-3

Table 2-3
OU I RA V South Boundary - Current Landfill Monitoring Well Data - Current Landfill
'Hits Only' July through September 2019

Site ID : 088-109

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1-Dichloroethane	09/05/2019	5.32	0.5	--	UG/L	13.50	
524.2 TVOC	09/05/2019	20.75	--	--	UG/L	13.50	
Benzene	09/05/2019	0.53	0.5	--	UG/L	13.50	
Chloroethane	09/05/2019	14.9	0.5	--	UG/L	13.50	

Table 2-3
OU I RA V South Boundary Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 088-109

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1-Dichloroethane	09/05/2019	5.32	0.5	--	UG/L	13.50	
524.2 TVOC	09/05/2019	20.75	--	--	UG/L	13.50	
Benzene	09/05/2019	0.53	0.5	--	UG/L	13.50	
Chloroethane	09/05/2019	14.9	0.5	--	UG/L	13.50	

Site ID : 088-26

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	09/19/2019	4.66	0.508	0.65	PCI/L	18.00	

Site ID : 098-30

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	09/19/2019	27	0.541	1.44	PCI/L	37.80	

Site ID : 098-99

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1-Dichloroethane	09/05/2019	3.21	0.5	--	UG/L	44.50	
524.2 TVOC	09/05/2019	3.74	--	--	UG/L	44.50	
Benzene	09/05/2019	0.26	0.5	--	UG/L	44.50	J
cis-1,2-Dichloroethylene	09/05/2019	0.27	0.5	--	UG/L	44.50	J

Site ID : 107-35

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	09/05/2019	4.27	0.787	0.827	PCI/L	65.00	

Site ID : 107-40

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1-Dichloroethane	09/17/2019	3.06	0.5	--	UG/L	145.00	
524.2 TVOC	09/17/2019	5.45	--	--	UG/L	145.00	
Chloroethane	09/17/2019	2.39	0.5	--	UG/L	145.00	

Site ID : 108-43

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	09/05/2019	4.16	0.604	0.709	PCI/L	65.00	

Site ID : 108-57

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	09/16/2019	4.19	0.552	0.678	PCI/L	70.00	

Site ID : 108-58

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	09/16/2019	4.67	0.647	0.7	PCI/L	70.00	

Table 2-3
OU I RA V South Boundary Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 115-13

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1-Dichloroethane	09/12/2019	0.19	0.5	--	UG/L	145.00	J
524.2 TVOC	09/12/2019	1.65	--	--	UG/L	145.00	
Chloroform	09/12/2019	1.46	0.5	--	UG/L	145.00	

Site ID : 115-16

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1-Dichloroethane	09/17/2019	2.25	0.5	--	UG/L	130.00	
524.2 TVOC	09/17/2019	5.24	--	--	UG/L	130.00	
Chloroethane	09/17/2019	2.99	0.5	--	UG/L	130.00	

Site ID : 115-51

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	09/19/2019	0	--	--	UG/L	140.00	

Table 2-4
OU I RA V South Boundary Extraction Well Data
'Hits Only' July through September 2019

Site ID : 115-27 (EW-1)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1-Dichloroethane	07/09/2019	2.46	0.5	--	UG/L	0.00	
524.2 TVOC	07/09/2019	5.54	--	--	UG/L	0.00	
Benzene	07/09/2019	0.17	0.5	--	UG/L	0.00	J
Chloroethane	07/09/2019	2.67	0.5	--	UG/L	0.00	
cis-1,2-Dichloroethylene	07/09/2019	0.24	0.5	--	UG/L	0.00	J

Site ID : 115-43 (EW-2)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/09/2019	0.57	--	--	UG/L	0.00	
Chloroform	07/09/2019	0.57	0.5	--	UG/L	0.00	

Qualifiers :

J = Estimated value.
D = Compound was identified in an analysis at a secondary dilution factor.

Organic Compounds :

B = Compound was found in both the sample And associated laboratory blank.

Inorganic Compounds :

B = Result Is between instrument detection limit And contract required reporting limit.

Section 3

Q3-2019 Operations Summary
OU III South Boundary Pump and Treat System

Process: Groundwater extraction and air stripping treatment, with discharge to both the OU III and RA V recharge basins.

Goal: Reach MCLs in core monitoring wells in OU III within 30 years for the Upper Glacial aquifer (by 2030).

Start Date: June 1997

Table 3-1
OU III South Boundary
Pumping Rates (gpm)

Extraction Well	EW-3	EW-4	EW-5	EW-6	EW-7	EW-8	EW-12	EW-17
Site ID	121-17	121-16	121-15	122-14	122-13	122-12	122-30	121-46
Screen Interval (ft bls)	150-190	160-180 &190-200	160-200	160-200	170-210	190-210 & 230-250	180-220	207-237
Desired Flow Rate (gpm)	0*	140	0*	0*	0*	0*	0*	150
July	0	93	0	0	0	0	0	0
August	0	0	0	0	0	0	0	120
September	0	57	0	0	0	0	0	94
Actual (Avg. over Qtr)	**0**	**75**	**0**	**0**	**0**	**0**	**0**	**107**

* Extraction wells placed in standby mode: EW-12 (2003), EW-8 (2006), EW-6 (2007), EW-7 (2007), EW-3 and EW-5 (2015).

Figure 3-1
OU III South Boundary
Cumulative Mass Removal of VOC's vs. Time

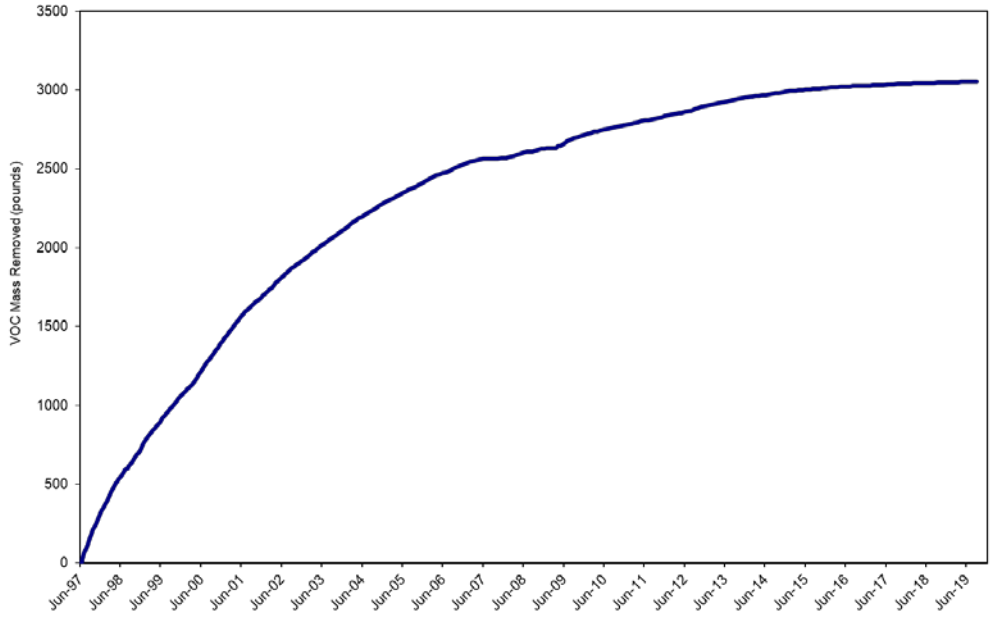


Figure 3-2
OU III South Boundary
Influent TVOC Concentration vs. Time

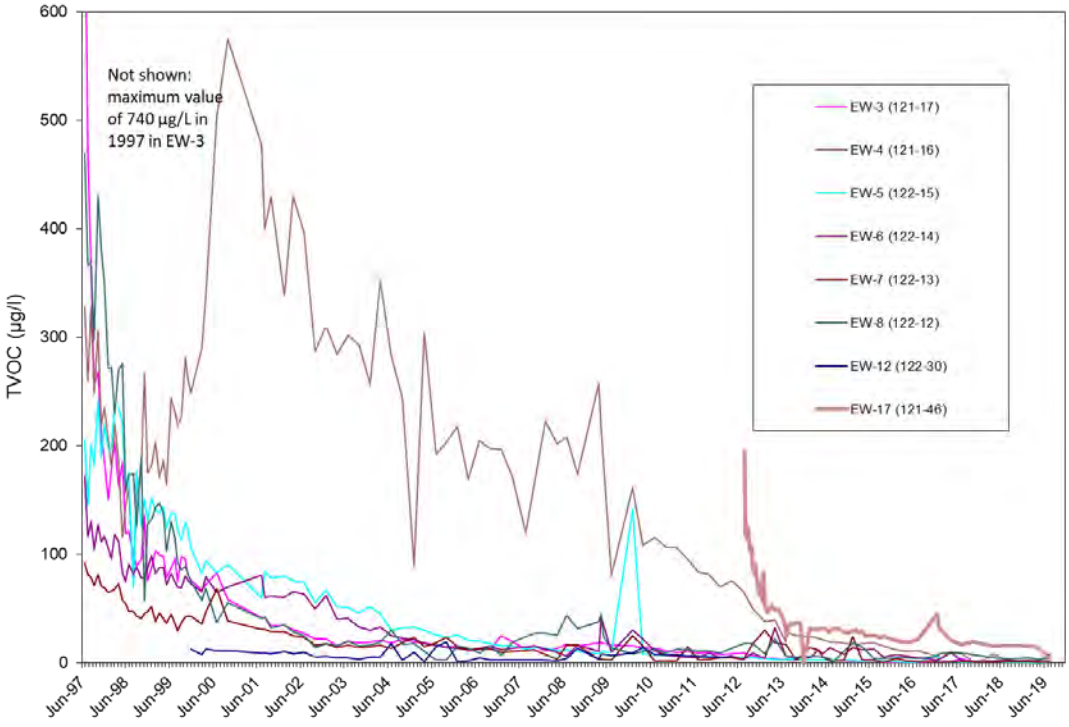


Table 3-2
OU III South Boundary Effluent Water Quality
SPDES Equivalency Permit Concentrations July 1 – September 30, 2019

Parameter	Permit Limit	Max. Measured Value	Units	Frequency
Flow	**Monitor**	**625,279[1]**	**GPD**	**Continuous**
pH (range)	**6.5 - 8.5**	**7.0– 7.5[2]**	**SU**	**Monthly[3]**
Carbon Tetrachloride	**5**	**<0.50**	**ug/L**	**Monthly[3]**
Chloroform	**7**	**<0.50**	**ug/L**	**Monthly[3]**
Dichlorodifluoromethane	**5**	**<0.50**	**ug/L**	**Monthly[3]**
1,1-Dichloroethane	**5**	**<0.50**	**ug/L**	**Monthly[3]**
1,1-Dichloroethylene	**5**	**<0.50**	**ug/L**	**Monthly[3]**
Methyl Chloride	**5**	**<0.50**	**ug/L**	**Monthly[3]**
Tetrachloroethylene	**5**	**<0.50**	**ug/L**	**Monthly[3]**
Toluene	**5**	**<0.50**	**ug/L**	**Monthly[3]**
1,1,1-Trichloroethane	**5**	**<0.50**	**ug/L**	**Monthly[3]**
1,1,2 Trichloroethane	**5**	**<0.50**	**ug/L**	**Monthly[3]**
Trichloroethylene	**10**	**<0.50**	**ug/L**	**Monthly[3]**

[1] = The maximum monthly average flow rate for both the OUIII South Boundary and Middle Road Systems, during the operational period.
[2] = The minimum and maximum pH values during the operational period.
[3] = Beginning in April 2003, a SPDES modification was approved revising the pH and volatile organic sampling to once a month.

System Operations

July 2019:

Extraction well EW-4 was in full time operation. EW-17 was down for the month while the pump and motor were repaired. Wells EW-3, EW-5, EW-6, EW-7, EW-8 and EW-12 remained in standby mode. The system treated approximately 4 million gallons of water.

August 2019:

The system operated normally for the month. Extraction well EW-4 was off for pulsed pumping, and EW-17 was in full time operation. Wells EW-3, EW-5, EW-6, EW-7, EW-8 and EW-12 remained in standby mode. The system treated approximately 5 million gallons of water.

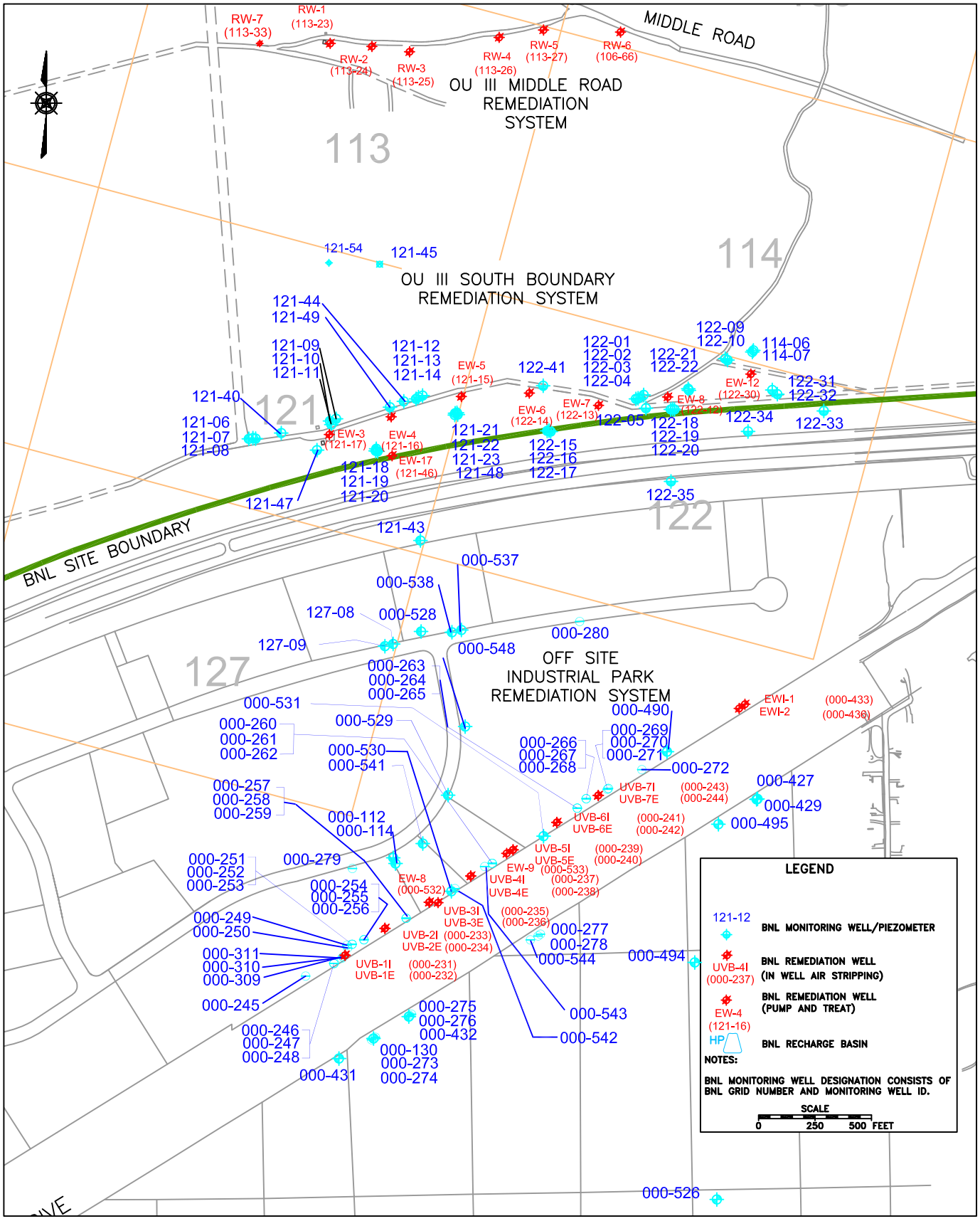
September 2019:

EW-4 was off for approximately 1.5 weeks for electrical repair. EW-17 was in full time operation. Wells EW-3, EW-5, EW-6, EW-7, EW-8 and EW-12 remained in standby mode. The system treated approximately 6.5 million gallons of water.

The system treated approximately 15.5 million gallons of water during the third quarter of 2019.

Planned Operational Changes

- Maintain wells EW-3, EW-5, EW-6, EW-7, EW-8, and EW-12 in standby mode. The system's extraction wells will continue to be sampled on a quarterly basis, except for EW-12 which is no longer sampled. The wells will be restarted if extraction or monitoring well data indicate TVOC concentrations exceed the 50 µg/L capture goal. During the third quarter, TVOC concentrations in extraction wells EW-3, EW-5, EW-6, EW-7, and EW-8 and adjacent monitoring wells were less than 50 µg/L.
- Continue to operate well EW-17 on a full-time basis. Continue pulsed pumping well EW-4 one month on and one month off. During the third quarter, TVOC concentrations in extraction wells EW-4 and EW-17 were less than 50 µg/L. TVOC concentrations in monitoring well 121-49, located upgradient of and at the same depth as EW-17, remains significantly above 50 µg/L in the third quarter.



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ENVIRONMENTAL PROTECTION DIVISION

TITLE: OU III SOUTH BOUNDARY/INDUSTRIAL PARK/INDUSTRIAL PARK EAST MONITORING WELL NETWORKS

SITEWIDE REMEDIATION SYSTEMS
THIRD QUARTER 2019 OPERATIONS REPORT

DWN:	VT:HZ.:	DATE:	PROJECT NO.:
JEB	–	09/12/14	–
CHKD:	APPD:	REV.:	NOTES:
RH	–	11/18/19	–

FIGURE NO.: 3–3

Table 3-3
OU III South Boundary Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 121-06

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/18/2019	1.12	--	--	UG/L	45.00	
Chloroform	07/18/2019	1.12	0.5	--	UG/L	45.00	

Site ID : 121-12

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/25/2019	2.12	--	--	UG/L	50.00	
Chloroform	07/25/2019	2.12	0.5	--	UG/L	50.00	

Site ID : 121-18

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/26/2019	1.95	--	--	UG/L	70.00	
Chloroform	07/26/2019	1.95	0.5	--	UG/L	70.00	

Site ID : 121-21

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/31/2019	0.29	--	--	UG/L	70.00	
Chloroform	07/31/2019	0.29	0.5	--	UG/L	70.00	J

Site ID : 121-45

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/17/2019	0.25	0.5	--	UG/L	199.50	J
524.2 TVOC	07/17/2019	8.2	--	--	UG/L	199.50	
Chloroform	07/17/2019	0.39	0.5	--	UG/L	199.50	J
Tetrachloroethylene	07/17/2019	7.1	0.5	--	UG/L	199.50	
Trichloroethylene	07/17/2019	0.46	0.5	--	UG/L	199.50	J

Site ID : 121-49

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/24/2019	0.89	0.5		UG/L	215.00	
1,1-Dichloroethylene	07/24/2019	1.05	0.5		UG/L	215.00	
524.2 TVOC	07/24/2019	155.43	--		UG/L	215.00	
Carbon tetrachloride	07/24/2019	33.9	0.5		UG/L	215.00	
Chloroform	07/24/2019	1.2	0.5		UG/L	215.00	
cis-1,2-Dichloroethylene	07/24/2019	0.21	0.5		UG/L	215.00	J
Tetrachloroethylene	07/24/2019	115	0.5		UG/L	215.00	E
Trichloroethylene	07/24/2019	3.18	0.5		UG/L	215.00	

Site ID : 122-10

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/19/2019	0.33	--	--	UG/L	154.50	

Table 3-3
OU III South Boundary Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 122-10

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Tetrachloroethylene	07/19/2019	0.33	0.5	--	UG/L	154.50	J

Table 3-4
OU III South Boundary Extraction Well Data
'Hits Only' July through September 2019

Site ID : 121-15 (EW-5)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/17/2019	1.31	--	--	UG/L	0.00	
Chloroform	07/17/2019	0.29	0.5	--	UG/L	0.00	J
Tetrachloroethylene	07/17/2019	0.41	0.5	--	UG/L	0.00	J
Toluene	07/17/2019	0.61	0.5	--	UG/L	0.00	

Site ID : 121-16 (EW-4)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/17/2019	0.2	0.5	--	UG/L	0.00	J
524.2 TVOC	07/17/2019	8.43	--	--	UG/L	0.00	
Carbon tetrachloride	07/17/2019	0.63	0.5	--	UG/L	0.00	
Chloroform	07/17/2019	0.43	0.5	--	UG/L	0.00	J
Tetrachloroethylene	07/17/2019	6.88	0.5	--	UG/L	0.00	
Trichloroethylene	07/17/2019	0.29	0.5	--	UG/L	0.00	J

Site ID : 121-17 (EW-3)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/17/2019	0.21	0.5	--	UG/L	0.00	J
524.2 TVOC	07/17/2019	7.48	--	--	UG/L	0.00	
Carbon tetrachloride	07/17/2019	0.49	0.5	--	UG/L	0.00	J
Chloroform	07/17/2019	0.42	0.5	--	UG/L	0.00	J
Tetrachloroethylene	07/17/2019	6.11	0.5	--	UG/L	0.00	
Trichloroethylene	07/17/2019	0.25	0.5	--	UG/L	0.00	J

Site ID : 121-46 (EW-17)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/17/2019	3.54	--	--	UG/L	0.00	
cis-1,2-Dichloroethylene	07/17/2019	0.26	0.5	--	UG/L	0.00	J
Tetrachloroethylene	07/17/2019	2.97	0.5	--	UG/L	0.00	
Trichloroethylene	07/17/2019	0.31	0.5	--	UG/L	0.00	J

Site ID : 122-12 (EW-8)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/17/2019	3.85	--	--	UG/L	0.00	
Chloroform	07/17/2019	0.2	0.5	--	UG/L	0.00	J
cis-1,2-Dichloroethylene	07/17/2019	0.3	0.5	--	UG/L	0.00	J
Tetrachloroethylene	07/17/2019	2.99	0.5	--	UG/L	0.00	
Trichloroethylene	07/17/2019	0.36	0.5	--	UG/L	0.00	J

Table 3-4
OU III South Boundary Extraction Well Data
'Hits Only' July through September 2019

Site ID : 122-13 (EW-7)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/17/2019	0.19	0.5	--	UG/L	0.00	J
524.2 TVOC	07/17/2019	1.32	--	--	UG/L	0.00	
Chloroform	07/17/2019	0.19	0.5	--	UG/L	0.00	J
cis-1,2-Dichloroethylene	07/17/2019	0.23	0.5	--	UG/L	0.00	J
Naphthalene	07/17/2019	0.17	0.5	--	UG/L	0.00	BJ
Tetrachloroethylene	07/17/2019	0.54	0.5	--	UG/L	0.00	

Site ID : 122-14 (EW-6)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/17/2019	0.2	0.5	--	UG/L	0.00	J
524.2 TVOC	07/17/2019	1.82	--	--	UG/L	0.00	
Chloroform	07/17/2019	0.52	0.5	--	UG/L	0.00	
Tetrachloroethylene	07/17/2019	0.88	0.5	--	UG/L	0.00	
Trichloroethylene	07/17/2019	0.22	0.5	--	UG/L	0.00	J

Table 3-5
OU III South Boundary Influent Data
'Hits Only' July through September 2019

Site ID : 121-41 (System Influent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/20/2019	0.57	0.5	--	UG/L	0.00	
1,1-Dichloroethylene	08/20/2019	0.38	0.5	--	UG/L	0.00	J
524.2 TVOC	08/20/2019	16.84	--	--	UG/L	0.00	
Carbon tetrachloride	08/20/2019	3.3	0.5	--	UG/L	0.00	
Chloroform	08/20/2019	0.58	0.5	--	UG/L	0.00	
cis-1,2-Dichloroethylene	08/20/2019	0.11	0.5	--	UG/L	0.00	J
Methyl chloride	08/20/2019	0.38	0.5	--	UG/L	0.00	J
Tetrachloroethylene	08/20/2019	11	0.5	--	UG/L	0.00	
Trichloroethylene	08/20/2019	0.52	0.5	--	UG/L	0.00	
1,1,1-Trichloroethane	09/04/2019	0.37	0.5	--	UG/L	0.00	J
1,1-Dichloroethylene	09/04/2019	0.23	0.5	--	UG/L	0.00	J
524.2 TVOC	09/04/2019	9.45	--	--	UG/L	0.00	
Carbon tetrachloride	09/04/2019	1.9	0.5	--	UG/L	0.00	
Chloroform	09/04/2019	0.5	0.5	--	UG/L	0.00	
Tetrachloroethylene	09/04/2019	6.1	0.5	--	UG/L	0.00	
Trichloroethylene	09/04/2019	0.35	0.5	--	UG/L	0.00	J

Table 3-6
OU III South Boundary Effluent Data
'Hits Only' July through September 2019

Site ID : 095-126 (System Effluent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/03/2019	0	--	--	UG/L	0.00	
1,4-Dioxane	09/18/2019	4.33	0.2	--	UG/L	0.00	
524.2 TVOC	09/18/2019	0	--	--	UG/L	0.00	

Qualifiers :

J = Estimated value.

D = Compound was identified in an analysis at a secondary dilution factor.

Organic Compounds :

B = Compound was found in both the sample And associated laboratory blank.

Inorganic Compounds :

B = Result Is between instrument detection limit And contract required reporting limit.

Section 4

Q3-2019 Operations Summary
OU III Middle Road Pump and Treat System

Process: Groundwater extraction and air stripping treatment, with discharge to both the OU III and RAV recharge basins.

Goal: Reach Maximum Contaminant Levels (MCLs) in core monitoring wells in OU III within 30 years for the Upper Glacial aquifer (by 2030).

Start Date: October 23, 2001

Table 4-1
OU III Middle Road
Pumping Rates (gpm)

Extraction Well	RW-1	RW-2	RW-3	RW-4	RW-5	RW-6	RW-7
Site Id #	113-23	113-24	113-25	113-26	113-27	106-66	113-33
Screen Interval (ft bls)	90-130	170-200	228-268	150-180	150-180	188-218	202-222
Desired Flow Rate (gpm)	0*	150	100	0*	0*	0*	100
July (Avg monthly gpm)	0	79	79	0	0	0	129
August " " "	0	88	80	0	0	0	146
September " " "	0	63	63	0	0	0	93
Actual (Avg. over Qtr.)	**0**	**77**	**74**	**0**	**0**	**0**	

* Extraction wells placed in standby mode: RW-4 and RW-5 (2003), RW-6 (2006), and RW-1 (2015).

Figure 4-1
OU III Middle Road
Cumulative Mass Removal of VOC's vs. Time

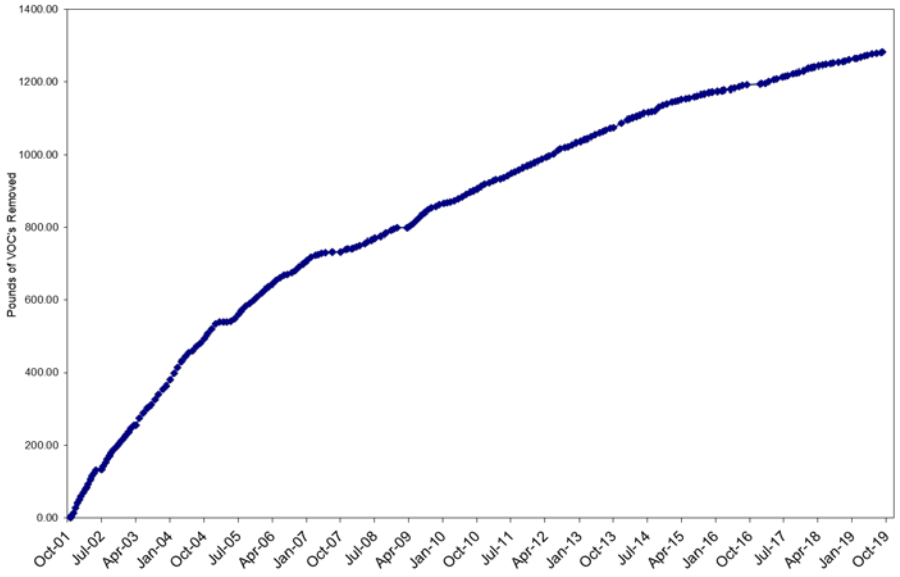


Figure 4-2
OU III Middle Road
Influent TVOC Concentrations vs. Time

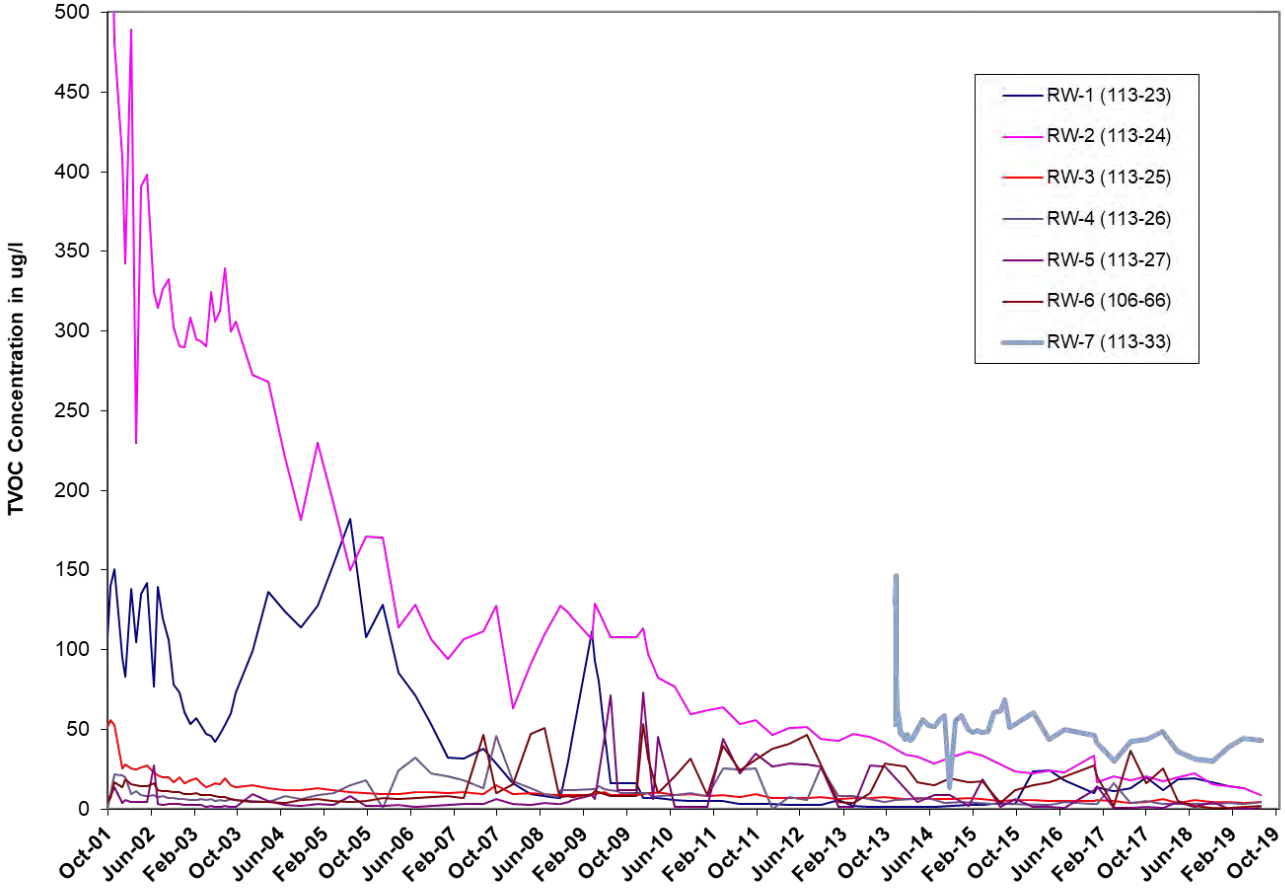


Table 4-2
OU III Middle Road Air-Stripping Tower Effluent Water Quality
SPDES Equivalency Permit Concentrations July 1, 2019 – September 30, 2019

Parameter	Permit Limit	Max. Measured Value	Units	Frequency
Flow	**Monitor**	**625, 279** [1]	**GPD**	**Continuous**
pH (range)	**6.5 - 8.5**	**7.0-7.5** [2]	**SU**	**Monthly**[3]
Carbon Tetrachloride	**5**	**<0.05**	**ug/L**	**Monthly**[3]
Chloroform	**7**	**<0.05**	**ug/L**	**Monthly**[3]
Dichlorodifluorometha	**5**	**<0.05**	**ug/L**	**Monthly**[3]
1,1-Dichloroethane	**5**	**<0.05**	**ug/L**	**Monthly**[3]
1,1-Dichloroethylene	**5**	**<0.05**	**ug/L**	**Monthly**[3]
Methyl Chloride	**5**	**<0.05**	**ug/L**	**Monthly**[3]
Tetrachloroethylene	**5**	**<0.05**	**ug/L**	**Monthly**[3]
Toluene	**5**	**<0.05**	**ug/L**	**Monthly**[3]
1,1,1-Trichloroethane	**5**	**<0.05**	**ug/L**	**Monthly**[3]
1,1,2 Trichloroethane	**5**	**<0.05**	**ug/L**	**Monthly**[3]
Trichloroethylene	**10**	**<0.05**	**ug/L**	**Monthly**[3]

[1] The maximum monthly average flow for the Middle Road and South Boundary Systems during the operational period.
[2] The minimum and maximum pH values for the Middle Road Effluent, during the operational period.
[3] Beginning in April 2003, a SPDES modification was approved revising the pH and volatile organic sampling to once a month.

System Operations

July 2019:

Extraction wells RW-2, RW-3, and RW-7 were in full time operation. Wells RW-1, RW-4, RW-5 and RW-6 remained in standby mode. The effluent sample was taken from the Middle Road and South Boundary tower effluent sample port since both air strippers were in operation. The system treated approximately 12.5 million gallons of water.

August 2019:

The system operated normally for the month. RW-2, RW-3, and RW-7 were in full time operation. Wells RW-1, RW-4, RW-5 and RW-6 remained in standby mode. The effluent sample was taken from the Middle Road tower effluent sample. The system treated approximately 13.5 million gallons of water.

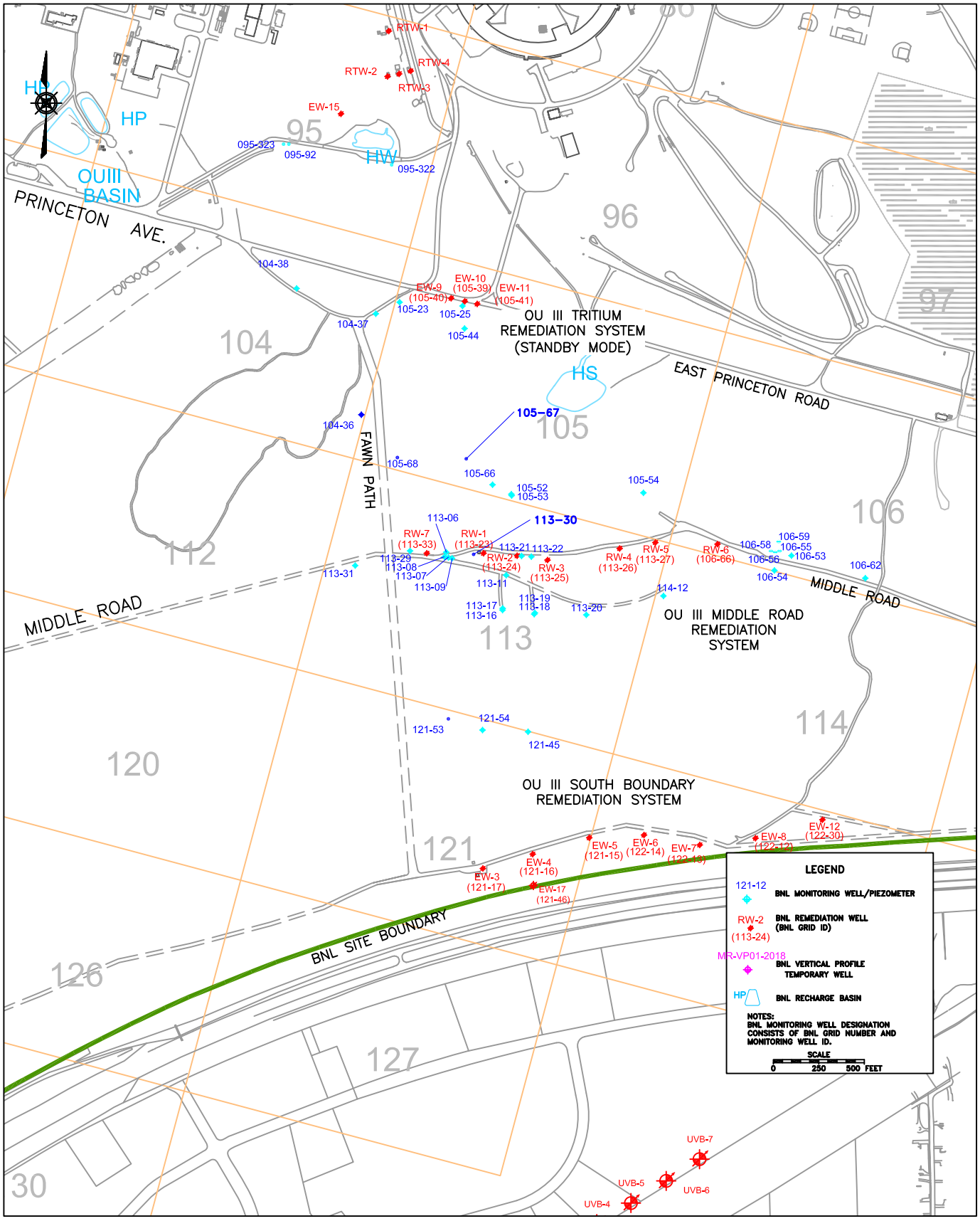
September 2019:

Extraction wells RW-2, RW-3, and RW-7 were in full time operation. Wells RW-1, RW- 4, RW-5 and RW-6 remained in standby mode. The system was down for five days for maintenance. The effluent sample was taken from Middle Road and South Boundary tower effluent sample port. The system treated approximately 9.5 million gallons of water.

The system treated approximately 35.5 million gallons of water during the third quarter of 2019.

Planned Operational Changes

- Continue operation of extraction wells RW-2, RW-3 and RW-7, and maintain RW-1, RW-4, RW-5 and RW-6 in standby mode. Restart the well(s) if extraction or monitoring well data indicate that TVOC concentrations exceed the 50 µg/L capture goal. TVOC concentrations in extraction wells RW-4, RW-5 and RW-6 and adjacent monitoring wells were below 50 µg/L in the third quarter. Well RW-1 was not sampled this quarter due to electrical maintenance.



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ENVIRONMENTAL
PROTECTION DIVISION

TITLE:

OU III MIDDLE ROAD MONITORING WELL NETWORK

SITEWIDE REMEDIATION SYSTEMS
THIRD QUARTER 2019 OPERATIONS REPORT

DWN:	VT:HZ.:	DATE:	PROJECT NO.:
JEB	–	02/08/07	–
CHKD:	APPD:	REV.:	NOTES:
RH	––	11/18/19	–

FIGURE NO.: 4–3

Table 4-3
OU III Middle Road Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 095-322

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/17/2019	3.5	0.5	--	UG/L	180.00	
1,1-Dichloroethane	07/17/2019	0.67	0.5	--	UG/L	180.00	
1,1-Dichloroethylene	07/17/2019	4.5	0.5	--	UG/L	180.00	
524.2 TVOC	07/17/2019	30.88	--	--	UG/L	180.00	
Chloroform	07/17/2019	0.6	0.5	--	UG/L	180.00	
Methyl tert-butyl ether	07/17/2019	0.31	0.5	--	UG/L	180.00	J
Tetrachloroethylene	07/17/2019	14	0.5	--	UG/L	180.00	
Trichloroethylene	07/17/2019	7.3	0.5	--	UG/L	180.00	

Site ID : 095-323

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/17/2019	2.5	0.5	--	UG/L	205.00	
1,1,2,2-Tetrachloroethane	07/17/2019	1.4	0.5	--	UG/L	205.00	
1,1-Dichloroethane	07/17/2019	0.14	0.5	--	UG/L	205.00	J
1,1-Dichloroethylene	07/17/2019	1.4	0.5	--	UG/L	205.00	
524.2 TVOC	07/17/2019	18.98	--	--	UG/L	205.00	
Chloroform	07/17/2019	0.34	0.5	--	UG/L	205.00	J
Tetrachloroethylene	07/17/2019	8.9	0.5	--	UG/L	205.00	
Trichloroethylene	07/17/2019	4.3	0.5	--	UG/L	205.00	

Site ID : 104-37

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/16/2019	77.94	--	--	UG/L	209.00	
Tetrachloroethylene	07/16/2019	66	5	--	UG/L	209.00	

Site ID : 105-23

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/16/2019	0.59	0.5	--	UG/L	180.00	
1,1-Dichloroethane	07/16/2019	0.15	0.5	--	UG/L	180.00	J
1,1-Dichloroethylene	07/16/2019	0.77	0.5	--	UG/L	180.00	
524.2 TVOC	07/16/2019	18.41	--	--	UG/L	180.00	
Carbon tetrachloride	07/16/2019	0.19	0.5	--	UG/L	180.00	J
Chloroform	07/16/2019	0.36	0.5	--	UG/L	180.00	J
Tetrachloroethylene	07/16/2019	16	0.5	--	UG/L	180.00	
Trichloroethylene	07/16/2019	0.35	0.5	--	UG/L	180.00	J

Site ID : 105-66

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/16/2019	176.2	--	--	UG/L	184.00	

Table 4-3
OU III Middle Road Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 105-66

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Tetrachloroethylene	07/16/2019	160	13	--	UG/L	184.00	

Site ID : 105-67

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/16/2019	62.39	--	--	UG/L	185.00	
Tetrachloroethylene	07/16/2019	52	5	--	UG/L	185.00	

Site ID : 105-68

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/16/2019	281.8	--	--	UG/L	205.00	
Tetrachloroethylene	07/16/2019	220	13	--	UG/L	205.00	

Site ID : 113-11

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/17/2019	2.43	--	--	UG/L	201.00	
Chloroform	07/17/2019	0.33	0.5	--	UG/L	201.00	J
Tetrachloroethylene	07/17/2019	2.1	0.5	--	UG/L	201.00	

Site ID : 113-17

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/17/2019	12.12	--	--	UG/L	177.00	
Chloroform	07/17/2019	0.44	0.5	--	UG/L	177.00	J
Methyl tert-butyl ether	07/17/2019	0.32	0.5	--	UG/L	177.00	J
Tetrachloroethylene	07/17/2019	11	0.5	--	UG/L	177.00	
Trichloroethylene	07/17/2019	0.36	0.5	--	UG/L	177.00	J

Site ID : 113-19

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/17/2019	12	0.5	--	UG/L	230.00	
1,1-Dichloroethane	07/17/2019	0.8	0.5	--	UG/L	230.00	
1,1-Dichloroethylene	07/17/2019	4.9	0.5	--	UG/L	230.00	
524.2 TVOC	07/17/2019	29.59	--	--	UG/L	230.00	
Carbon tetrachloride	07/17/2019	5.9	0.5	--	UG/L	230.00	
Chloroform	07/17/2019	0.98	0.5	--	UG/L	230.00	
cis-1,2-Dichloroethylene	07/17/2019	0.43	0.5	--	UG/L	230.00	J
Methylene chloride	07/17/2019	0.68	0.5	--	UG/L	230.00	
Trichloroethylene	07/17/2019	3.9	0.5	--	UG/L	230.00	

Site ID : 113-30

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/17/2019	20	--	--	UG/L	190.00	

Table 4-3
OU III Middle Road Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 113-30

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Carbon tetrachloride	07/17/2019	8.2	0.5	--	UG/L	190.00	
Chloroform	07/17/2019	2.3	0.5	--	UG/L	190.00	
Tetrachloroethylene	07/17/2019	9.5	0.5	--	UG/L	190.00	

Site ID : 113-31

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/16/2019	1.2	0.5	--	UG/L	190.00	
1,1-Dichloroethylene	07/16/2019	0.46	0.5	--	UG/L	190.00	J
524.2 TVOC	07/16/2019	2.09	--	--	UG/L	190.00	
Trichloroethylene	07/16/2019	0.43	0.5	--	UG/L	190.00	J

Site ID : 114-12

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1-Dichloroethane	07/17/2019	0.11	0.5	--	UG/L	155.00	J
524.2 TVOC	07/17/2019	0.78	--	--	UG/L	155.00	
Chloroform	07/17/2019	0.67	0.5	--	UG/L	155.00	

Site ID : 121-45

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/17/2019	0.25	0.5	--	UG/L	199.50	J
524.2 TVOC	07/17/2019	8.2	--	--	UG/L	199.50	
Chloroform	07/17/2019	0.39	0.5	--	UG/L	199.50	J
Tetrachloroethylene	07/17/2019	7.1	0.5	--	UG/L	199.50	
Trichloroethylene	07/17/2019	0.46	0.5	--	UG/L	199.50	J

Site ID : 121-53

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/18/2019	71.01	--	--	UG/L	229.00	
Tetrachloroethylene	07/18/2019	50.9	1	--	UG/L	229.00	

Table 4-4
OU III Middle Road Extraction Well Data
'Hits Only' July through September 2019

Site ID : 106-66 (RW-6)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/17/2019	0.19	0.5	--	UG/L	0.00	J
524.2 TVOC	07/17/2019	1.83	--	--	UG/L	0.00	
Chloroform	07/17/2019	0.23	0.5	--	UG/L	0.00	J
Tetrachloroethylene	07/17/2019	1.41	0.5	--	UG/L	0.00	

Site ID : 113-24 (RW-2)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/17/2019	8.71	--	--	UG/L	0.00	
Carbon tetrachloride	07/17/2019	0.66	0.5	--	UG/L	0.00	
Chloroform	07/17/2019	0.5	0.5	--	UG/L	0.00	
Tetrachloroethylene	07/17/2019	7.1	0.5	--	UG/L	0.00	
Trichloroethylene	07/17/2019	0.45	0.5	--	UG/L	0.00	J

Site ID : 113-25 (RW-3)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/17/2019	1.98	0.5	--	UG/L	0.00	
1,1-Dichloroethane	07/17/2019	0.41	0.5	--	UG/L	0.00	J
1,1-Dichloroethylene	07/17/2019	0.78	0.5	--	UG/L	0.00	
524.2 TVOC	07/17/2019	4.32	--	--	UG/L	0.00	
Tetrachloroethylene	07/17/2019	0.22	0.5	--	UG/L	0.00	J
Trichloroethylene	07/17/2019	0.93	0.5	--	UG/L	0.00	

Site ID : 113-26 (RW-4)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/17/2019	3.45	--	--	UG/L	0.00	
Carbon tetrachloride	07/17/2019	0.91	0.5	--	UG/L	0.00	
Chloroform	07/17/2019	0.92	0.5	--	UG/L	0.00	
Tetrachloroethylene	07/17/2019	0.2	0.5	--	UG/L	0.00	J
Trichloroethylene	07/17/2019	1.42	0.5	--	UG/L	0.00	

Site ID : 113-27 (RW-5)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/17/2019	0.64	--	--	UG/L	0.00	
Chloroform	07/17/2019	0.64	0.5	--	UG/L	0.00	

Site ID : 113-33 (RW-7)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/17/2019	1.26	0.5	--	UG/L	0.00	

Table 4-4
OU III Middle Road Extraction Well Data
'Hits Only' July through September 2019

Site ID : 113-33 (RW-7)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,2,2-Tetrachloroethane	07/17/2019	0.31	0.5	--	UG/L	0.00	J
1,1-Dichloroethane	07/17/2019	0.17	0.5	--	UG/L	0.00	J
1,1-Dichloroethylene	07/17/2019	0.8	0.5	--	UG/L	0.00	
524.2 TVOC	07/17/2019	43.25	--	--	UG/L	0.00	
Carbon tetrachloride	07/17/2019	2.64	0.5	--	UG/L	0.00	
Chloroform	07/17/2019	0.62	0.5	--	UG/L	0.00	
Methyl tert-butyl ether	07/17/2019	0.21	0.5	--	UG/L	0.00	J
Tetrachloroethylene	07/17/2019	36.2	0.5	--	UG/L	0.00	
Trichloroethylene	07/17/2019	1.04	0.5	--	UG/L	0.00	

Table 4-5
OU III Middle Road Influent Data
'Hits Only' July through September 2019

Site ID : 113-34 (Combo Influent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/17/2019	0.65	0.5	--	UG/L	0.00	
1,1-Dichloroethylene	07/17/2019	0.37	0.5	--	UG/L	0.00	J
524.2 TVOC	07/17/2019	14.04	--	--	UG/L	0.00	
Carbon tetrachloride	07/17/2019	0.91	0.5	--	UG/L	0.00	
Chloroform	07/17/2019	0.59	0.5	--	UG/L	0.00	
Tetrachloroethylene	07/17/2019	10.7	0.5	--	UG/L	0.00	
Trichloroethylene	07/17/2019	0.82	0.5	--	UG/L	0.00	
1,1,1-Trichloroethane	08/20/2019	1	0.5	--	UG/L	0.00	
1,1-Dichloroethylene	08/20/2019	0.37	0.5	--	UG/L	0.00	J
524.2 TVOC	08/20/2019	20.46	--	--	UG/L	0.00	
Carbon tetrachloride	08/20/2019	1.9	0.5	--	UG/L	0.00	
Chloroform	08/20/2019	0.41	0.5	--	UG/L	0.00	J
Tetrachloroethylene	08/20/2019	16	0.5	--	UG/L	0.00	
Trichloroethylene	08/20/2019	0.78	0.5	--	UG/L	0.00	
1,1,1-Trichloroethane	09/04/2019	1.1	0.5	--	UG/L	0.00	
1,1-Dichloroethylene	09/04/2019	0.44	0.5	--	UG/L	0.00	J
524.2 TVOC	09/04/2019	21.73	--	--	UG/L	0.00	
Carbon tetrachloride	09/04/2019	2	0.5	--	UG/L	0.00	
Chloroform	09/04/2019	0.41	0.5	--	UG/L	0.00	J
Tetrachloroethylene	09/04/2019	17	0.5	--	UG/L	0.00	
Trichloroethylene	09/04/2019	0.78	0.5	--	UG/L	0.00	

Table 4-6
OU III Middle Road Effluent Data
'Hits Only' July through September 2019

Site ID : 095-270 (System Effluent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/17/2019	0	--	--	UG/L	0.00	
524.2 TVOC	07/18/2019	0	--	--	UG/L	0.00	
524.2 TVOC	08/20/2019	0.21	--	--	UG/L	0.00	
Methyl chloride	08/20/2019	0.21	0.5	--	UG/L	0.00	J
524.2 TVOC	09/04/2019	0	--		UG/L	0.00	

Qualifiers :

J = Estimated value.
D = Compound was identified in an analysis at a secondary dilution factor.

Organic Compounds :

B = Compound was found in both the sample And associated laboratory blank.

Inorganic Compounds :

B = Result Is between instrument detection limit And contract required reporting limit.

Section 5

Q3-2019 Operations Summary
OU III Industrial Park In-Well Air Stripping System

Process: Groundwater extraction and in-well air stripping treatment, with discharge in same well (recirculating well technology) for wells UVB-1 through UVB-7, and groundwater extraction and liquid phase granular activated carbon treatment, with discharge to injection wells for wells EW-8 and EW-9.

Goal: Reach Maximum Contaminant Levels (MCLs) in core monitoring wells within 30 years for the Upper Glacial aquifer (by 2030), and 65 years for the Magothy aquifer (by 2065).

Start Date: September 1999

Table 5-1
OU III Industrial Park
Pumping Rates (gpm)

Recirculation Treatment Well	**UVB-1**	**UVB-2**	**UVB-3**	**UVB-4**	**UVB-5**	**UVB-6**	**UVB-7**	**EW-8**	**EW-9**
Site Id #	000-231	000-233	000-235	000-237	000-239	000-241	000-243	000-532	000-533
Screened Interval (feet below grade)	220-240	195-215	194-214	170-190	180-200	190-210	205-225	230-250	220-240
Desired Flow Rate (GPM)	*0	*0	*0	*0	*0	*0	*0	**0	**0
July	*0	*0	*0	*0	*0	*0	*0	**0	**0
August	*0	*0	*0	*0	*0	*0	*0	**0	**0
September	*0	*0	*0	*0	*0	*0	*0	**0	**0
Actual (Avg.over Qtr.)	*0	*0	*0	*0	*0	*0	*0	**0	**0

Note: UVB-1, UVB-7 and UVB-2 were placed in standby mode in 2005, 2009, and 2010 respectively. The system was shut down and placed in stand-by mode in 2013. In March 2014, wells UVB-3 through UVB-6 were restarted due to elevated VOCs.
*Wells UVB-1 to UVB-7 were placed in stand-by mode February 2017.
Wells EW-8 and EW-9 started full-time operation January 2015.
**Wells EW-8 and EW-9 started one month on and one month off pulsed pumping February 2018 and placed in stand-by mode July 2019.

Figure 5-1
OU III Industrial Park
Cumulative Mass Removal of VOCs vs. Time

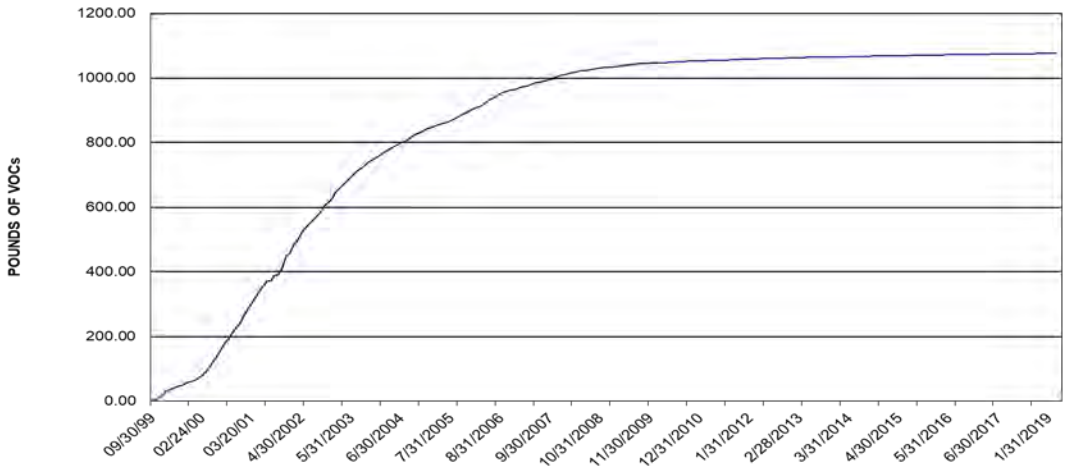
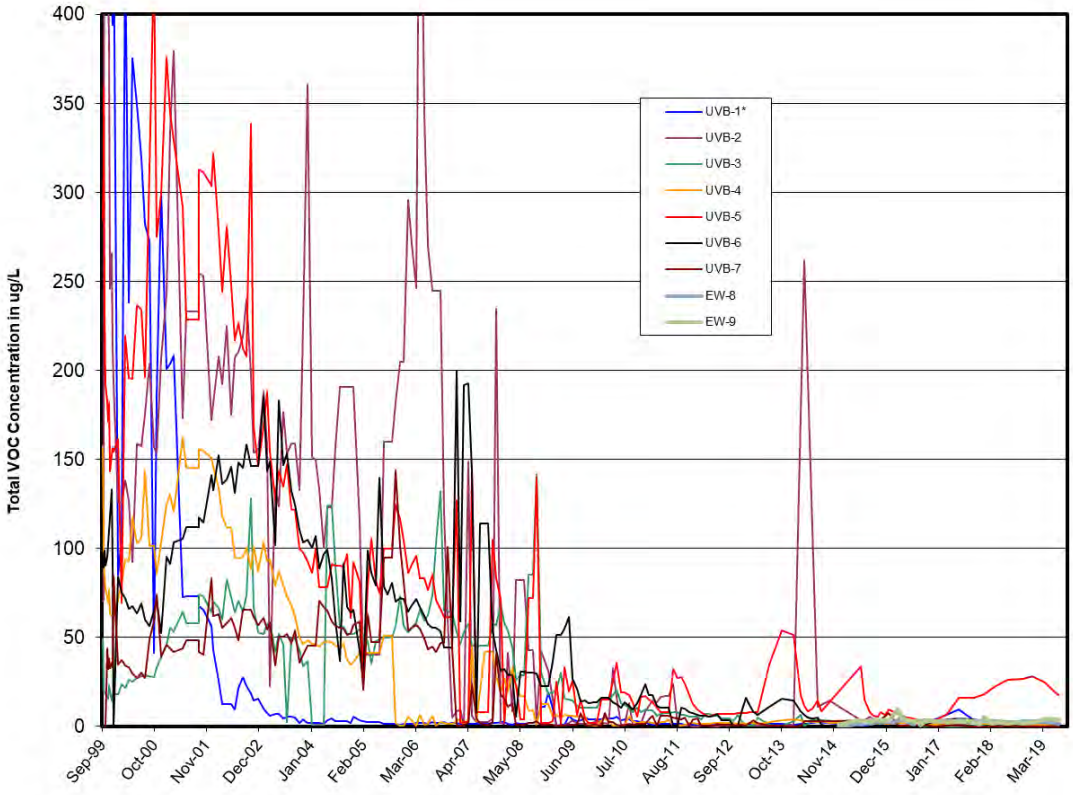


Figure 5-2
OU III Industrial Park
Influent TVOC Concentrations vs. Time



*Startup concentrations for UVB-1 are not illustrated on this graph.
TVOC concentration of 1,900 µg/L in September 1999, and 1,485 µg/L in October 1999.

Table 5-2
OU III Industrial Park Effluent Water Quality for EW-8 and EW-9
SPDES Equivalency Permit Concentrations July 1 – September 30, 2019

Parameter	Permit Limit	Max. Measured Value	Units	Frequency
Flow	**Monitor**	**N/A**	**GPM**	**Continuous**
pH (range)	**5.0 - 8.5**	**N/A**	**SU**	**Weekly**
Carbon Tetrachloride	**5**	**N/A**	**ug/L**	**Monthly[1]**
Chloroform	**7**	**N/A**	**ug/L**	**Monthly[1]**
1,2-Dichloroethane	**0.6**	**N/A**	**ug/L**	**Monthly[1]**
1,1-Dichloroethylene	**5**	**N/A**	**ug/L**	**Monthly[1]**
Tetrachloroethylene	**5**	**N/A**	**ug/L**	**Monthly[1]**
Trichloroethene	**5**	**N/A**	**ug/L**	**Monthly[1]**
1,1,1-Trichloroethane	**5**	**N/A**	**ug/L**	**Monthly[1]**

[1] The minimum measurement frequency shall be monthly following a period of 24 consecutive weekly sampling events showing no exceedances of the stated discharge limitations. Monthly sampling was initiated in August 2015.

System Operation

July 2019:

Extraction wells UVB-1 through UVB-7 remained in stand-by mode. Wells EW-8 and EW-9 were placed in stand-by mode on July 1st.

August 2019:

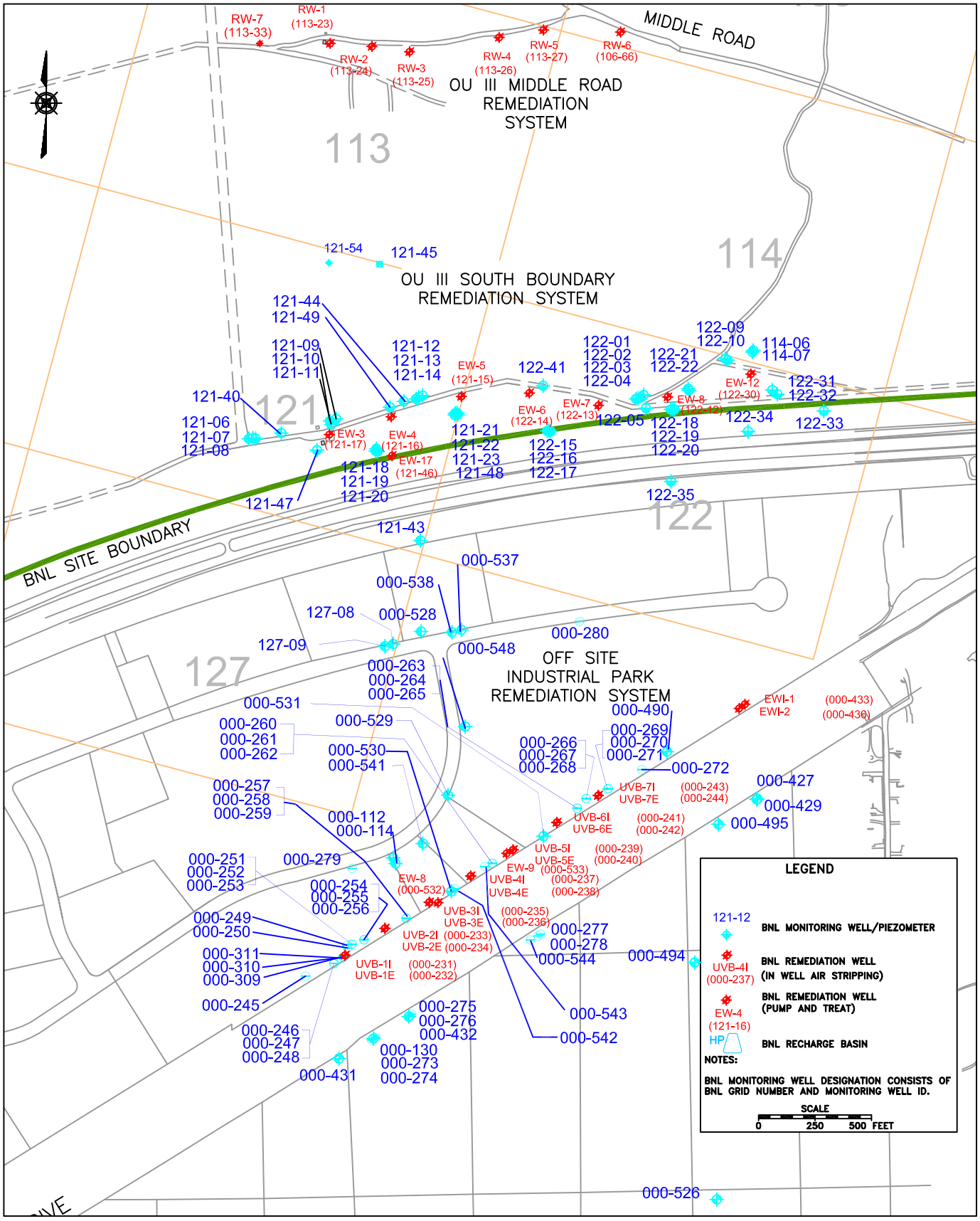
Extraction wells UVB-1 through UVB-7, EW-8 and EW-9 remained in stand-by mode.

September 2019:

Extraction wells UVB-1 through UVB-7, EW-8 and EW-9 remained in stand-by mode.

Planned Operational Changes

- Maintain the seven UVB wells, and EW-8 and EW-9 in standby. If TVOC concentrations exceed the 50 µg/L capture goal adjacent to any of the wells they may be restarted. During the third quarter, TVOC concentrations in the UVB extraction wells and EW-8 and EW-9, and adjacent core monitoring wells were below 50 µg/L.



\\OERNT\GIS\GW_PROJECTS\ERD_QUARTERLIES\3Q_2019\FIG 5-3.DWG

ENVIRONMENTAL PROTECTION DIVISION

TITLE: OU III SOUTH BOUNDARY/INDUSTRIAL PARK/INDUSTRIAL PARK EAST MONITORING WELL NETWORKS

SITEWIDE REMEDIATION SYSTEMS
THIRD QUARTER 2019 OPERATIONS REPORT

DWN:	VT:HZ.:	DATE:	PROJECT NO.:
JEB	–	09/12/14	–
CHKD:	APPD:	REV.:	NOTES:
RH	–	11/18/19	–

FIGURE NO.: 5–3

Table 5-3
OU III Industrial Park Monitoring Well Data
"Hits Only" - July through September 2019

Site ID : 000-112

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/27/2019	0.19	--	--	UG/L	180.00	
Tetrachloroethylene	08/27/2019	0.19	0.5	--	UG/L	180.00	J

Site ID : 000-249

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/27/2019	1.29	--	--	UG/L	264.00	
Carbon tetrachloride	08/27/2019	0.79	0.5	--	UG/L	264.00	
Tetrachloroethylene	08/27/2019	0.5	0.5	--	UG/L	264.00	

Site ID : 000-253

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/27/2019	0.73	--	--	UG/L	225.50	
Carbon tetrachloride	08/27/2019	0.37	0.5	--	UG/L	225.50	J
Tetrachloroethylene	08/27/2019	0.36	0.5	--	UG/L	225.50	J

Site ID : 000-256

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/26/2019	0.95	--	--	UG/L	222.50	
Carbon tetrachloride	08/26/2019	0.4	0.5	--	UG/L	222.50	J
Tetrachloroethylene	08/26/2019	0.55	0.5	--	UG/L	222.50	

Site ID : 000-259

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/26/2019	2.85	--	--	UG/L	202.50	
Carbon tetrachloride	08/26/2019	0.65	0.5	--	UG/L	202.50	
Tetrachloroethylene	08/26/2019	2.2	0.5	--	UG/L	202.50	

Site ID : 000-262

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/27/2019	5.3	0.5	--	UG/L	182.50	
1,1-Dichloroethylene	08/27/2019	2.3	0.5	--	UG/L	182.50	
1,2-Dichloroethane	08/27/2019	0.24	0.5	--	UG/L	182.50	J
524.2 TVOC	08/27/2019	19.34	--	--	UG/L	182.50	
Carbon tetrachloride	08/27/2019	5.6	0.5	--	UG/L	182.50	
cis-1,2-Dichloroethylene	08/27/2019	1.3	0.5	--	UG/L	182.50	
Tetrachloroethylene	08/27/2019	2.5	0.5	--	UG/L	182.50	
Trichloroethylene	08/27/2019	2.1	0.5	--	UG/L	182.50	

Site ID : 000-265

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/15/2019	0.5	--	--	UG/L	212.50	
Tetrachloroethylene	08/15/2019	0.24	0.5	--	UG/L	212.50	J
Toluene	08/15/2019	0.26	0.5	--	UG/L	212.50	J

Table 5-3
OU III Industrial Park Monitoring Well Data
"Hits Only" - July through September 2019

Site ID : 000-268

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/26/2019	0.36	--	--	UG/L	215.50	
Carbon tetrachloride	08/26/2019	0.36	0.5	--	UG/L	215.50	J

Site ID : 000-271

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/26/2019	0	--	--	UG/L	215.50	

Site ID : 000-279

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/19/2019	1.31	--	--	UG/L	193.00	
Carbon tetrachloride	08/19/2019	0.43	0.5	--	UG/L	193.00	J
Tetrachloroethylene	08/19/2019	0.88	0.5	--	UG/L	193.00	

Site ID : 000-528

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/16/2019	0.33	0.5	--	UG/L	220.00	J
524.2 TVOC	08/16/2019	3.89	--	--	UG/L	220.00	
Carbon tetrachloride	08/16/2019	0.41	0.5	--	UG/L	220.00	J
cis-1,2-Dichloroethylene	08/16/2019	0.26	0.5	--	UG/L	220.00	J
Tetrachloroethylene	08/16/2019	2.6	0.5	--	UG/L	220.00	
Trichloroethylene	08/16/2019	0.29	0.5	--	UG/L	220.00	J

Site ID : 000-529

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/15/2019	9.5	0.5	--	UG/L	215.00	
1,1-Dichloroethane	08/15/2019	0.19	0.5	--	UG/L	215.00	J
1,1-Dichloroethylene	08/15/2019	3.7	0.5	--	UG/L	215.00	
524.2 TVOC	08/15/2019	26.96	--	--	UG/L	215.00	
Carbon tetrachloride	08/15/2019	2.9	0.5	--	UG/L	215.00	
cis-1,2-Dichloroethylene	08/15/2019	0.17	0.5	--	UG/L	215.00	J
Methyl tert-butyl ether	08/15/2019	0.8	0.5	--	UG/L	215.00	
Tetrachloroethylene	08/15/2019	7	0.5	--	UG/L	215.00	
Trichloroethylene	08/15/2019	2.7	0.5	--	UG/L	215.00	

Site ID : 000-530

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/26/2019	23	0.5	--	UG/L	210.00	
1,1-Dichloroethane	08/26/2019	0.35	0.5	--	UG/L	210.00	J
1,1-Dichloroethylene	08/26/2019	6.4	0.5	--	UG/L	210.00	
524.2 TVOC	08/26/2019	32.73	--	--	UG/L	210.00	
Carbon tetrachloride	08/26/2019	0.74	0.5	--	UG/L	210.00	
cis-1,2-Dichloroethylene	08/26/2019	0.26	0.5	--	UG/L	210.00	J
Methyl tert-butyl ether	08/26/2019	0.28	0.5	--	UG/L	210.00	J
Trichloroethylene	08/26/2019	1.7	0.5	--	UG/L	210.00	

Table 5-3
OU III Industrial Park Monitoring Well Data
"Hits Only" - July through September 2019

Site ID : 000-531

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/15/2019	3.6	0.5	--	UG/L	205.00	
1,1-Dichloroethylene	08/15/2019	2.3	0.5	--	UG/L	205.00	
1,2-Dichloroethane	08/15/2019	0.37	0.5	--	UG/L	205.00	J
524.2 TVOC	08/15/2019	31.47	--	--	UG/L	205.00	
Carbon tetrachloride	08/15/2019	17	0.5	--	UG/L	205.00	
Tetrachloroethylene	08/15/2019	1	0.5	--	UG/L	205.00	
Trichloroethylene	08/15/2019	7.2	0.5	--	UG/L	205.00	

Site ID : 000-537

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/19/2019	9.4	0.5	--	UG/L	245.00	
1,1-Dichloroethane	08/19/2019	0.28	0.5	--	UG/L	245.00	J
1,1-Dichloroethylene	08/19/2019	2.7	0.5	--	UG/L	245.00	
524.2 TVOC	08/19/2019	39.68	--	--	UG/L	245.00	
Carbon tetrachloride	08/19/2019	1.6	0.5	--	UG/L	245.00	
cis-1,2-Dichloroethylene	08/19/2019	0.4	0.5	--	UG/L	245.00	J
Tetrachloroethylene	08/19/2019	17	0.5	--	UG/L	245.00	
Trichloroethylene	08/19/2019	8.3	0.5	--	UG/L	245.00	

Site ID : 000-538

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/19/2019	3.5	0.5	--	UG/L	215.00	
1,1-Dichloroethylene	08/19/2019	1.3	0.5	--	UG/L	215.00	
524.2 TVOC	08/19/2019	17.98	--	--	UG/L	215.00	
Carbon tetrachloride	08/19/2019	0.95	0.5	--	UG/L	215.00	
cis-1,2-Dichloroethylene	08/19/2019	0.73	0.5	--	UG/L	215.00	
Tetrachloroethylene	08/19/2019	7.6	0.5	--	UG/L	215.00	
Trichloroethylene	08/19/2019	3.9	0.5	--	UG/L	215.00	

Site ID : 000-541

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/27/2019	3.1	0.5	--	UG/L	235.00	
1,1-Dichloroethane	08/27/2019	0.18	0.5	--	UG/L	235.00	J
1,1-Dichloroethylene	08/27/2019	1.2	0.5	--	UG/L	235.00	
524.2 TVOC	08/27/2019	40.35	--	--	UG/L	235.00	
Carbon tetrachloride	08/27/2019	17	0.5	--	UG/L	235.00	
Chloroform	08/27/2019	4.9	0.5	--	UG/L	235.00	
cis-1,2-Dichloroethylene	08/27/2019	0.17	0.5	--	UG/L	235.00	J
Tetrachloroethylene	08/27/2019	5.1	0.5	--	UG/L	235.00	
Trichloroethylene	08/27/2019	8.7	0.5	--	UG/L	235.00	

Site ID : 000-542

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/26/2019	0	--	--	UG/L	235.00	

Site ID : 000-543

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/27/2019	0	--	--	UG/L	230.00	

Table 5-3
OU III Industrial Park Monitoring Well Data
"Hits Only" - July through September 2019

Site ID : 000-544

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/20/2019	12	0.5	--	UG/L	230.00	
1,1-Dichloroethylene	08/20/2019	4.5	0.5	--	UG/L	230.00	
1,2-Dichloroethane	08/20/2019	0.24	0.5	--	UG/L	230.00	J
524.2 TVOC	08/20/2019	24.12	--	--	UG/L	230.00	
Carbon tetrachloride	08/20/2019	5.6	0.5	--	UG/L	230.00	
cis-1,2-Dichloroethylene	08/20/2019	0.28	0.5	--	UG/L	230.00	J
Trichloroethylene	08/20/2019	1.5	0.5	--	UG/L	230.00	

Site ID : 000-548

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/19/2019	12	0.5	--	UG/L	235.00	
1,1-Dichloroethylene	08/19/2019	2.9	0.5	--	UG/L	235.00	
524.2 TVOC	08/19/2019	27.15	--	--	UG/L	235.00	
Carbon tetrachloride	08/19/2019	3.3	0.5	--	UG/L	235.00	
cis-1,2-Dichloroethylene	08/19/2019	0.2	0.5	--	UG/L	235.00	J
Tetrachloroethylene	08/19/2019	0.25	0.5	--	UG/L	235.00	J
Trichloroethylene	08/19/2019	8.5	0.5	--	UG/L	235.00	

Site ID : 127-08

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/16/2019	1.2	0.5	--	UG/L	240.00	
1,1-Dichloroethylene	08/16/2019	0.43	0.5	--	UG/L	240.00	J
524.2 TVOC	08/16/2019	31.83	--	--	UG/L	240.00	
Carbon tetrachloride	08/16/2019	7.9	0.5	--	UG/L	240.00	
Tetrachloroethylene	08/16/2019	20	0.5	--	UG/L	240.00	
Trichloroethylene	08/16/2019	2.3	0.5	--	UG/L	240.00	

Site ID : 127-09

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/16/2019	2.97	--	--	UG/L	225.00	
Carbon tetrachloride	08/16/2019	0.87	0.5	--	UG/L	225.00	
Tetrachloroethylene	08/16/2019	2.1	0.5	--	UG/L	225.00	

Qualifiers :
J = Estimated value.
D = Compound was identified in an analysis at a secondary dilution factor.

Table 5-4
OU III Industrial Park Extraction Well Data
"Hits Only" - July through September 2019

Site ID : 000-532 (EW-8)

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/09/2019	1.3	0.5	--	UG/L	253.00	
1,1-Dichloroethylene	07/09/2019	0.55	0.5	--	UG/L	253.00	
524.2 TVOC	07/09/2019	1.85	--	--	UG/L	253.00	

Site ID : 000-533 (EW-9)

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/09/2019	1.8	0.5	--	UG/L	243.00	
1,1-Dichloroethane	07/09/2019	0.68	0.5	--	UG/L	243.00	
1,1-Dichloroethylene	07/09/2019	1.2	0.5	--	UG/L	243.00	
524.2 TVOC	07/09/2019	3.68	--	--	UG/L	243.00	

Table 5-5
OU III Industrial Park Influent Data
"Hits Only" - July through September 2019

Site ID : 000-231 (UVB-1 Influent)

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/30/2019	0	--	--	UG/L	230.00	

Site ID : 000-233 (UVB-2 Influent)

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/30/2019	1.23	--	--	UG/L	205.00	
Chloroform	07/30/2019	1	0.5	--	UG/L	205.00	
Tetrachloroethylene	07/30/2019	0.23	0.5	--	UG/L	205.00	J

Site ID : 000-235 (UVB-3 Influent)

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/30/2019	0.27	--	--	UG/L	204.00	
Methyl tert-butyl ether	07/30/2019	0.27	0.5	--	UG/L	204.00	J

Site ID : 000-237 (UVB-4 Influent)

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/30/2019	0.21	0.5	--	UG/L	180.00	J
524.2 TVOC	07/30/2019	0.74	--	--	UG/L	180.00	
Tetrachloroethylene	07/30/2019	0.53	0.5	--	UG/L	180.00	

Site ID : 000-239 (UVB-5 Influent)

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/30/2019	2	0.5	--	UG/L	190.00	
1,1-Dichloroethylene	07/30/2019	0.88	0.5	--	UG/L	190.00	
524.2 TVOC	07/30/2019	17.33	--	--	UG/L	190.00	
Carbon tetrachloride	07/30/2019	6.9	0.5	--	UG/L	190.00	
Chloroform	07/30/2019	0.85	0.5	--	UG/L	190.00	
cis-1,2-Dichloroethylene	07/30/2019	0.7	0.5	--	UG/L	190.00	
Tetrachloroethylene	07/30/2019	1.9	0.5	--	UG/L	190.00	
Trichloroethylene	07/30/2019	4.1	0.5	--	UG/L	190.00	

Site ID : 000-241 (UVB-6 Influent)

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/30/2019	0.23	0.5	--	UG/L	200.00	J
524.2 TVOC	07/30/2019	0.23	--	--	UG/L	200.00	

Site ID : 000-243 (UVB-7 Influent)

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/30/2019	0	--	--	UG/L	215.00	

Qualifiers :
J = Estimated value.
D = Compound was identified in an analysis at a secondary dilution factor.

Section 6

OU III Former Carbon Tetrachloride Pump & Treat System (System Closed)

The Draft Petition for Closure for the OU III Carbon Tetrachloride Groundwater Removal Action was submitted to the regulators for review in August 2009. Following the incorporation of EPA comments, in October 2009 the Final Petition for Closure for the OU III Carbon Tetrachloride Groundwater Removal Action was issued to the regulators. EPA and NYSDEC provided approval in October 2009. Since that time, activities have been concluded with decommissioning and dismantling of the Carbon Tetrachloride treatment system. A decommissioning report was submitted to the regulators in March 2011.

Section 7
Q3-2019 Operations Summary
OU III Building 96 Pump and Treat System

Process: Three (3) re-circulation wells each connected to an individual shallow tray air-stripping unit and one (1) well with a shallow tray air-stripping unit, with discharge to a drainage culvert and Recharge Basin HS.

Goal: Remediation of the volatile organic compounds (VOCs) in the source area and reach Maximum Contaminant Levels (MCLs) in core monitoring wells within 30 years for the Upper Glacial aquifer (by 2030).

Start Date: January 2001

Table 7-1
OU III Building 96
Pumping Rates (gpm)

Recirculation Treatment Well	RTW-1	RTW-2	RTW-3	RTW-4
Site Id #	095-151	095-153	095-155	095-157
Screen Interval (feet bls)	48-58	48-58	48-58	48-58
Desired Flow Rate (gpm)	60	30	0	0
July	60	18	0	0
August	59	11	0	0
September	62	19	0	0
Actual (Avg. over Qtr.)	**61**	**16**	**0**	**0**

Note: RTW-1 was restarted in 2008 with discharge to Basin HS. RTW-2 and RTW-3 were placed in standby mode in January 2016. RTW-4 was placed in stand-by mode in 2012. RTW-2 was restarted in November 2018. In June 2019, RTW-1 pumping rate was increased from 30 gpm to 60 gpm.

Figure 7-1
OU III Building 96
Cumulative Mass Removal of VOC's vs. Time

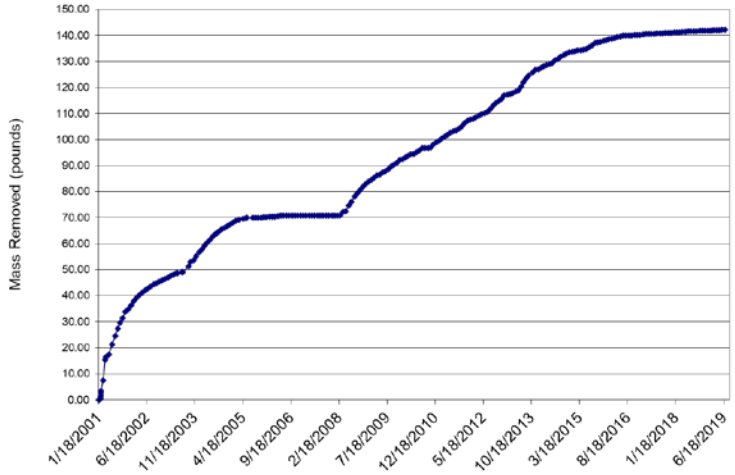


Figure 7-2
OU III Building 96
Influent TVOC Concentrations vs. Time

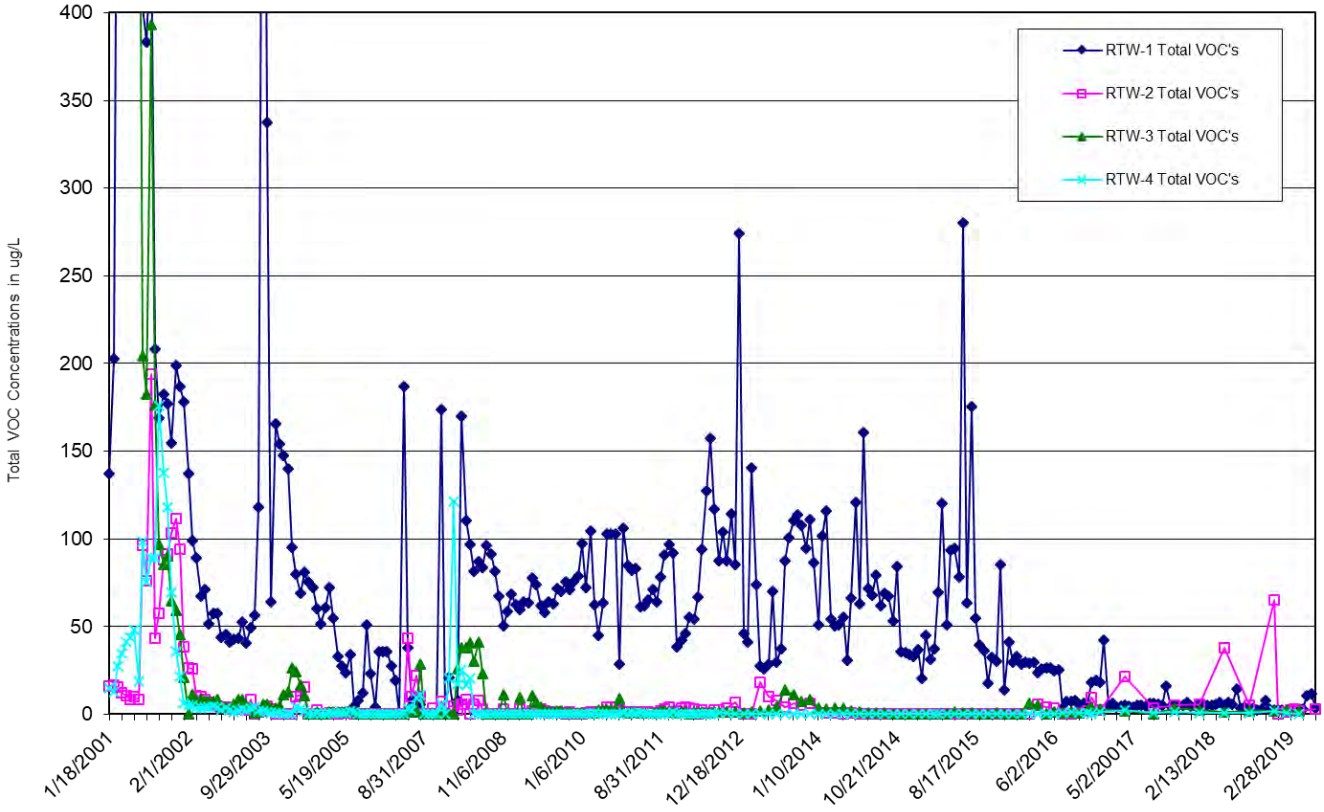


Table 7-2
Effluent Water Quality for RTW-1
SPDES Equivalency Permit Concentrations July 1, 2019– September 30, 2019

Parameter	Permit Limit	Max. Measured Value	Units	Frequency*
Flow	**40**	**62**	**GPM**	**Continuous**
pH (range)	**5.0 - 8.5**	**6.3 – 7.7**	**SU**	**Weekly**
Tetrachloroethylene	**5.0**	**<0.5**	**ug/L**	**Monthly**
1,1,1-Trichloroethane	**5.0**	**<0.5**	**ug/L**	**Monthly**
Thallium	**Monitor**	**<2.0**	**ug/L**	**Monthly**
Trichlorofluoromethane	**5.0**	**<0.5**	**ug/L**	**Monthly**
Methyl Bromide	**5.0**	**<0.5**	**ug/L**	**Monthly**
Methyl Chloride	**5.0**	**<0.5**	**ug/L**	**Monthly**
Methylene Chloride	**5.0**	**<0.5**	**ug/L**	**Monthly**

ND = Not detected.
* The required effluent sampling frequency is monthly following a period of 24 consecutive weekly with no exceedances. Weekly for pH.
Note: Starting in June 2019, the flow from Bldg. 96 RTW-1 was increased to 60 gallons per minute and the water is being treated at the Building 452 Freon-11 treatment system due to the larger capacity of that system. Beginning with the July Discharge Monitoring Report (DMR), the RTW-1 discharge is formally reported under the Freon-11 Equivalency Permit. The data are also provided here for informational purposes.

System Operations

July 2019:

RTW-2 was off for several days due to electrical issues. RTW-3 and RTW-4 remained in standby mode. The system treated approximately 3.4 million gallons of water.

August2019:

RTW-2 was off from August 9th to August 26th for repair of a pressure switch. RTW-3 and RTW-4 remained in standby mode. The system treated approximately 3 million gallons of water.

September 2019:

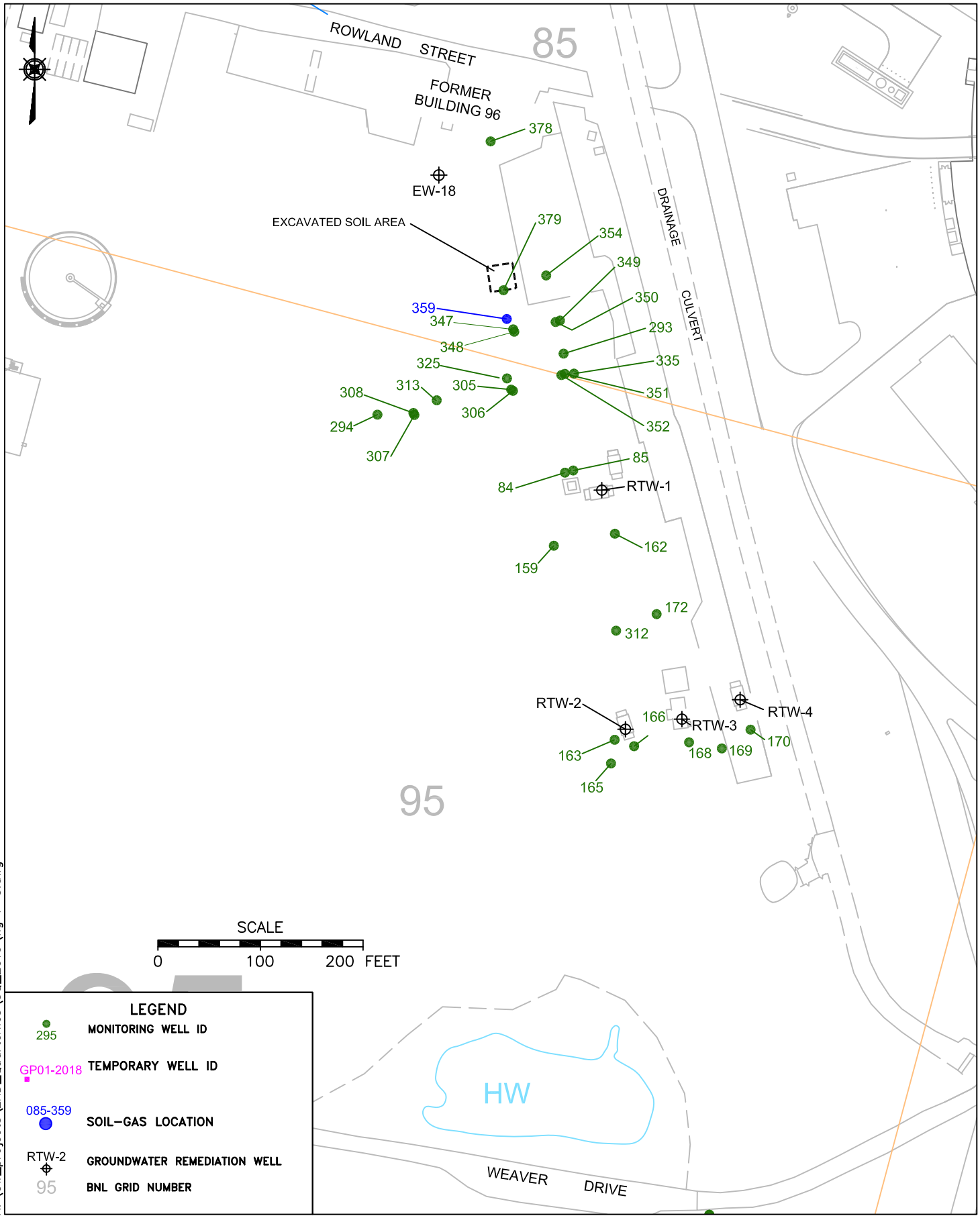
RTW-1 was off for approximately ten days due to electrical issues. Wells RTW-3 and RTW-4 remained in standby mode. The system treated approximately 3.6 million gallons of water.

The system treated approximately 10.5 million gallons of water during the third quarter of 2019.

During the third quarter of 2019, the highest PCE concentration in the Building 96 monitoring wells was 140 µg/L in well 095-159. The maximum PCE detection in extraction well RTW-1 in the third quarter was 12 µg/L. Trichlorofluoromethane (Freon-11) was detected at 1.5 µg/L in RTW-1.

Planned Operational Changes

- Maintain full time operation of treatment well RTW-1 at 60 gpm. Continue operating RTW-2 based on elevated TVOC concentrations observed in upgradient well 095-159. Maintain a monthly sampling frequency of the influent and effluent.
- Maintain a monthly monitoring frequency for well 095-159 to monthly to evaluate the influence of increased pumping rate of RTW-1 and westward expansion of the capture zone.
- Maintain treatment wells RTW-3 and RTW-4 in standby mode and continue quarterly sampling. Restart any of the wells if extraction or monitoring well data indicate that TVOC concentrations exceed 50 µg/L. During the third quarter of 2019, the maximum TVOC concentration was 27 µg/L in monitoring well 095-312. This well is located between extraction well RTW-1 and RTW-2. Neither RTW-3 or RTW-4 exceeded a TVOC concentration of 50 µg/L.
- Install a monitoring well in October at the location of B96-GP02-2019 and screen from -15 to -25 feet mean sea level (ft. msl.).



BROOKHAVEN NATIONAL LABORATORY

ENVIRONMENTAL PROTECTION DIVISION

TITLE:

OU III BUILDING 96 MONITORING WELL NETWORK

SITEWIDE REMEDIATION SYSTEMS
THIRD QUARTER 2019 OPERATIONS REPORT

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
AJZ	–	06/15/18	–
CHKD:	APPD:	REV.:	NOTES:
JEB	WRD	11/18/19	–

FIGURE NO.: 7-3

Table 7-3
OU III Building 96 Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 085-293

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/05/2019	2.2	--		UG/L	50.00	
Chloroform	07/05/2019	2.2	0.5		UG/L	50.00	

Site ID : 085-335

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/05/2019	11	--		UG/L	35.00	
Tetrachloroethylene	07/05/2019	11	0.5		UG/L	35.00	

Site ID : 085-349

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/05/2019	15.5	--		UG/L	22.50	
Bromodichloromethane	07/05/2019	2.5	0.5		UG/L	22.50	
Chloroform	07/05/2019	6.2	0.5		UG/L	22.50	
Dibromochloromethane	07/05/2019	1.6	0.5		UG/L	22.50	
Tetrachloroethylene	07/05/2019	5.2	0.5		UG/L	22.50	

Site ID : 085-350

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/05/2019	7.6	--		UG/L	34.50	
Tetrachloroethylene	07/05/2019	7.6	0.5		UG/L	34.50	

Site ID : 085-351

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/05/2019	2.4	--		UG/L	22.50	
Tetrachloroethylene	07/05/2019	2.4	0.5		UG/L	22.50	

Site ID : 085-352

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/05/2019	39	--		UG/L	34.50	
524.2 TVOC	07/05/2019	32	--		UG/L	34.50	
Tetrachloroethylene	07/05/2019	32	0.5		UG/L	34.50	
Tetrachloroethylene	07/05/2019	39	0.5		UG/L	34.50	

Site ID : 085-354

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/03/2019	3.5	--		UG/L	22.50	
Tetrachloroethylene	07/03/2019	3.5	0.5		UG/L	22.50	

Site ID : 085-378

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/08/2019	0	--	--	UG/L	20.00	

Table 7-3
OU III Building 96 Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 085-379

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Tetrachloroethylene	07/03/2019	100	5		UG/L	17.96	

Site ID : 095-159

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Tetrachloroethylene	07/03/2019	140	5		UG/L	50.00	
Tetrachloroethylene	08/05/2019	130	5	--	UG/L	50.00	
Tetrachloroethylene	09/03/2019	78	5	--	UG/L	50.00	

Site ID : 095-162

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/03/2019	2.93	--		UG/L	50.00	
Chloroform	07/03/2019	0.93	0.5		UG/L	50.00	
Tetrachloroethylene	07/03/2019	2	0.5		UG/L	50.00	

Site ID : 095-163

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/02/2019	0	--	--	UG/L	50.00	

Site ID : 095-165

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/02/2019	0	--	--	UG/L	50.00	

Site ID : 095-166

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/02/2019	0	--	--	UG/L	50.00	

Site ID : 095-168

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/02/2019	0	--	--	UG/L	50.00	

Site ID : 095-169

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/02/2019	0.7	--	--	UG/L	50.00	
Tetrachloroethylene	07/02/2019	0.7	0.5	--	UG/L	50.00	

Site ID : 095-170

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/02/2019	0	--	--	UG/L	50.00	

Site ID : 095-172

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/03/2019	2.9	--		UG/L	50.00	

Table 7-3
OU III Building 96 Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 095-172

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Chloroform	07/03/2019	1.9	0.5		UG/L	50.00	
Tetrachloroethylene	07/03/2019	1	0.5		UG/L	50.00	

Site ID : 095-305

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/08/2019	2.6	--	--	UG/L	22.50	
Tetrachloroethylene	07/08/2019	2.6	0.5	--	UG/L	22.50	

Site ID : 095-306

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/08/2019	30	--	--	UG/L	34.50	
Tetrachloroethylene	07/08/2019	30	0.5	--	UG/L	34.50	

Site ID : 095-312

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/03/2019	0.53	0.5		UG/L	50.00	
524.2 TVOC	07/03/2019	27.31	--		UG/L	50.00	
Chloroform	07/03/2019	1	0.5		UG/L	50.00	
Tetrachloroethylene	07/03/2019	25	0.5		UG/L	50.00	
Trichlorofluoromethane	07/03/2019	0.78	0.5		UG/L	50.00	

Site ID : 095-318

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/05/2019	0.8	--		UG/L	65.00	
Tetrachloroethylene	07/05/2019	0.8	0.5		UG/L	65.00	

Site ID : 095-84

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/03/2019	10	--		UG/L	30.00	
Tetrachloroethylene	07/03/2019	10	0.5		UG/L	30.00	

Site ID : 095-85

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/03/2019	0	--		UG/L	95.00	

Table 7-5
OU III Building 96 Influent Data
'Hits Only' July through September 2019

Site ID : 095-151 (RTW-1 Influent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/02/2019	14.6	--	--	UG/L	0.00	
Chloroform	07/02/2019	1.1	0.5	--	UG/L	0.00	
Tetrachloroethylene	07/02/2019	12	0.5	--	UG/L	0.00	
Trichlorofluoromethane	07/02/2019	1.5	0.5	--	UG/L	0.00	
524.2 TVOC	07/17/2019	14.27	--	--	UG/L	0.00	
Chloroform	07/17/2019	1	0.5	--	UG/L	0.00	
Methylene chloride	07/17/2019	0.3	0.5	--	UG/L	0.00	J
Tetrachloroethylene	07/17/2019	12	0.5	--	UG/L	0.00	
Trichlorofluoromethane	07/17/2019	0.97	0.5	--	UG/L	0.00	
524.2 TVOC	08/06/2019	12.59	--	--	UG/L	0.00	
Chloroform	08/06/2019	0.88	0.5	--	UG/L	0.00	
Tetrachloroethylene	08/06/2019	11	0.5	--	UG/L	0.00	
Trichlorofluoromethane	08/06/2019	0.71	0.5	--	UG/L	0.00	
524.2 TVOC	08/20/2019	10.87	--	--	UG/L	0.00	
Chloroform	08/20/2019	0.82	0.5	--	UG/L	0.00	
Methyl chloride	08/20/2019	0.22	0.5	--	UG/L	0.00	J
Tetrachloroethylene	08/20/2019	9	0.5	--	UG/L	0.00	
Trichlorofluoromethane	08/20/2019	0.83	0.5	--	UG/L	0.00	
524.2 TVOC	09/04/2019	9.92	--	--	UG/L	0.00	
Chloroform	09/04/2019	0.86	0.5	--	UG/L	0.00	
Tetrachloroethylene	09/04/2019	8.3	0.5	--	UG/L	0.00	
Trichlorofluoromethane	09/04/2019	0.76	0.5	--	UG/L	0.00	
524.2 TVOC	09/17/2019	9.94	--	--	UG/L	0.00	
Chloroform	09/17/2019	0.9	0.5	--	UG/L	0.00	
Tetrachloroethylene	09/17/2019	8.4	0.5	--	UG/L	0.00	
Trichlorofluoromethane	09/17/2019	0.64	0.5	--	UG/L	0.00	

Site ID : 095-153 (RTW-2 Influent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/02/2019	2.9	--	--	UG/L	0.00	
Tetrachloroethylene	07/02/2019	2.9	0.5	--	UG/L	0.00	
524.2 TVOC	08/06/2019	2.69	--	--	UG/L	0.00	
Chloroform	08/06/2019	0.29	0.5	--	UG/L	0.00	J
Tetrachloroethylene	08/06/2019	2.4	0.5	--	UG/L	0.00	

Table 7-5
OU III Building 96 Influent Data
'Hits Only' July through September 2019

Site ID : 095-153 (RTW-2 Influent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	09/04/2019	2.46	--	--	UG/L	0.00	
Chloroform	09/04/2019	0.33	0.5	--	UG/L	0.00	J
Tetrachloroethylene	09/04/2019	1.8	0.5	--	UG/L	0.00	
Trichlorofluoromethane	09/04/2019	0.33	0.5	--	UG/L	0.00	J

Site ID : 095-155 (RTW-3 Influent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/02/2019	2.4	--	--	UG/L	0.00	
Tetrachloroethylene	07/02/2019	2.4	0.5	--	UG/L	0.00	

Site ID : 095-157 (RTW-4 Influent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/02/2019	1.5	--	--	UG/L	0.00	
Chloroform	07/02/2019	1.5	0.5	--	UG/L	0.00	

Table 7-6
OU III Building 96 Effluent Data
'Hits Only' July through September 2019

Site ID : 095-154 (RTW-2 Effluent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/02/2019	0	--	--	UG/L	0.00	
524.2 TVOC	08/06/2019	0	--	--	UG/L	0.00	
524.2 TVOC	09/04/2019	0	--	--	UG/L	0.00	

Qualifiers :

J = Estimated value.

D = Compound was identified in an analysis at a secondary dilution factor.

Organic Compounds :

B = Compound was found in both the sample And associated laboratory blank.

Inorganic Compounds :

B = Result Is between instrument detection limit And contract required reporting limit.

Section 8

OU IV Former Air Sparge/Soil Vapor Extraction System (System Closed)

A petition was submitted in June 2002 for closure of this project. The EPA and DEC provided their approval for system closure in July 2003. The system was decommissioned in the fall of 2003. Per the *2010 Groundwater Status Report*, groundwater monitoring related to the OU I Air Sparge/Soil Vapor Extraction System is concluded.

Section 9

Q3-2019 Operations Summary
OU VI Ethylene Dibromide Pump & Treat System

Process: Groundwater extraction and liquid phase granular activated carbon treatment, with discharge to injection wells.

Goal: Reach the ethylene dibromide Maximum Contaminant Level (MCL) in core monitoring wells within 30 years for the Upper Glacial aquifer (by 2030).

Start Date: October 2004

Table 9-1
OU VI Ethylene Dibromide Pump and Treat System
Pumping Rates (gpm)

Extraction Well	EW-1E	EW-2E
Site Id #	000-503	000-504
Screened Interval (feet below grade)	115-135	115-135
Desired Flow Rate (GPM)	160	190
July	92	86
August	58	51
September	160	178
Actual (Avg. over Qtr.)	**103**	**105**

Figure 9-1
OU VI Cumulative Mass Removal of EDB vs. Time

Note: Due to the low concentrations of ethylene dibromide in the extraction wells, presentation of a mass removal graph is not appropriate.

Figure 9-2
OU VI Ethylene Dibromide
Influent EDB Concentration vs. Time

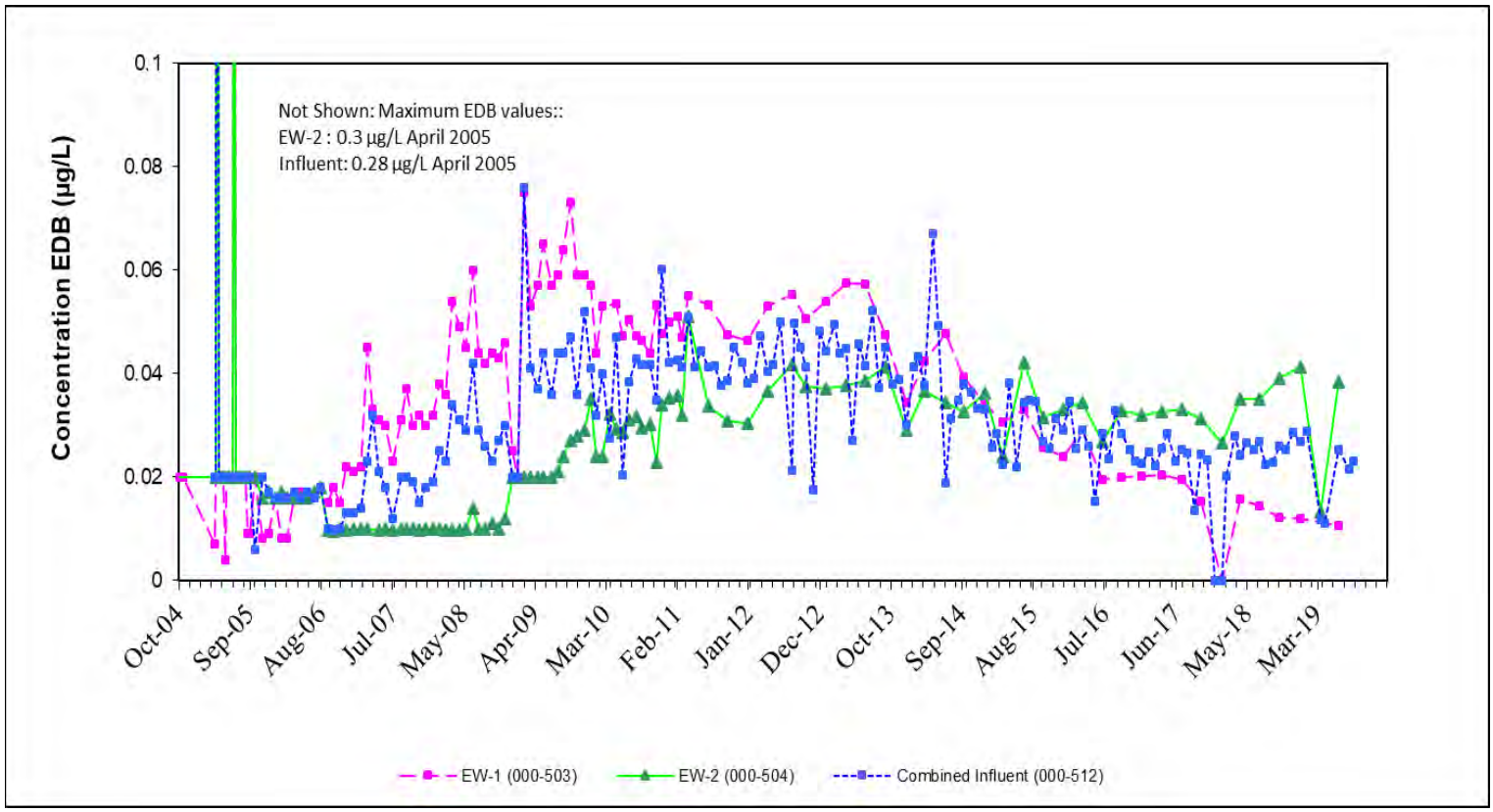


Table 9-2
OU VI Ethylene Dibromide Effluent Water Quality
SPDES Equivalency Permit Concentrations July 1, 2019 – September 30, 2019

Parameter	Permit Limit	Max. Measured Value	Units	Frequency
Flow	**450**	**338**	**GPM**	**Continuous**
pH	**5.0 - 8.5**	**6.0-6.5**	**SU**	**Weekly**
Ethylene Dibromide	**.03**	**<0.02**	**ug/L**	**Monthly****
Chloroform	**7.0**	**0.6**	**ug/L**	**Monthly****
1,1-Dichloroethene	**5.0**	**<0.5**	**ug/L**	**Monthly****
1,1,1-Trichloroethane	**5.0**	**<0.5**	**ug/L**	**Monthly****
Methyl Chloride	**5.0**	**<0.5**	**ug/L**	**Monthly****
Methylene Chloride	**5.0**	**<0.5**	**ug/L**	**Monthly****

***Minimum to maximum value for pH during this operational period.**
** **The minimum measurement frequency shall be monthly following a period of 24 consecutive weekly sampling events showing no exceedances of the stated discharge limitations.**

System Operations Summary

July 2019:

The system was shut off July 16th for a carbon change-out. After the change-out, the Panelview readout for the control system was not operating. A new Panelview screen was ordered. The system treated approximately 7 million gallons of water.

August 2019:

The system was restarted August 20th following replacement of the control screen. The system treated approximately 5 million gallons of water.

September 2019:

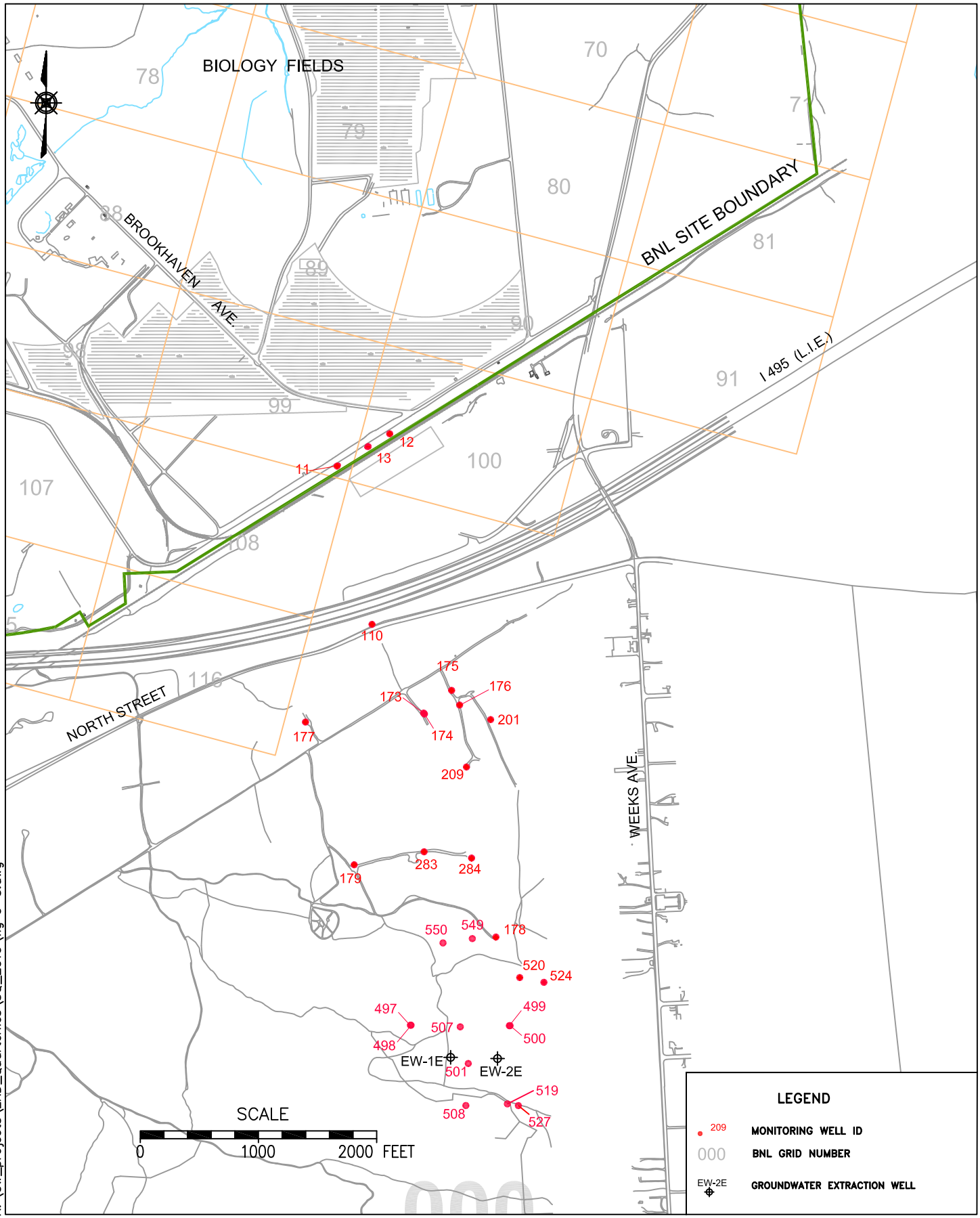
The system ran normally for the month. The system treated approximately 14 million gallons of water.

The system treated approximately 26 million gallons of water during the third quarter of 2019.

Planned Operational Changes

- Maintain full time operation of the treatment system and continue quarterly sampling of the extraction wells.

- Update the groundwater model based on the analytical results from the two vertical profiles installed in December 2018 to better refine the remaining time required to remediate the EDB plume to below the drinking water standard.



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BROOKHAVEN NATIONAL LABORATORY

ENVIRONMENTAL PROTECTION DIVISION

TITLE:

OU VI EDB

SITEWIDE REMEDIATION SYSTEMS

THIRD QUARTER 2019 OPERATIONS REPORT

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
JEB	–	09/26/05	–
CHKD:	APPD:	REV.:	NOTES:
RH	--	11/18/19	–

FIGURE NO.: 9-3

Table 9-3
OU VI Ethylene Dibromide Extraction Well Data
"Hits Only" - July through September 2019

Site ID : 000-503 (EW-1)

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/02/2019	1.27	--	--	UG/L	0.00	
Chloroform	07/02/2019	1.27	0.5	--	UG/L	0.00	
EDB	07/02/2019	0.0106	0.02	--	UG/L	0.00	J

Site ID : 000-504 (EW-2)

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/02/2019	1.36	--	--	UG/L	0.00	
Chloroform	07/02/2019	1.36	0.5	--	UG/L	0.00	
EDB	07/02/2019	0.0385	0.0199	--	UG/L	0.00	

Qualifiers :
J = Estimated value.
D = Compound was identified in an analysis at a secondary dilution factor.

Table 9-4
OU VI Ethylene Dibromide Influent Data
"Hits Only" - July through September 2019

Site ID : 000-512 (Combined Influent)

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/02/2019	1.06	--	--	UG/L	0.00	
Chloroform	07/02/2019	1.06	0.5	--	UG/L	0.00	
EDB	07/02/2019	0.0253	0.0198	--	UG/L	0.00	
524.2 TVOC	08/21/2019	1.51	--	--	UG/L	0.00	
Chloroform	08/21/2019	1.51	0.5	--	UG/L	0.00	
EDB	08/21/2019	0.0216	0.0197	--	UG/L	0.00	
524.2 TVOC	09/10/2019	1.3	--	--	UG/L	0.00	
Chloroform	09/10/2019	1.3	0.5	--	UG/L	0.00	
EDB	09/10/2019	0.023	0.0196	--	UG/L	0.00	

Table 9-5
OU VI Ethylene Dibromide Effluent Data
"Hits Only" - July through September 2019

Site ID : 000-510 (System Effluent)

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/02/2019	0.55	--	--	UG/L	0.00	
Chloroform	07/02/2019	0.55	0.5	--	UG/L	0.00	
524.2 TVOC	08/21/2019	0	--	--	UG/L	0.00	
524.2 TVOC	09/10/2019	0	--	--	UG/L	0.00	

Section 10

Q-3 2019 Quarterly Operations Summary
OU III HFBR Tritium Pump and Recharge System
(System Closed)

Process: Pump and recharge (to the RAV basin) with monitored natural attenuation for tritium. Carbon filtration is also included in the pump and recharge system to remove VOCs that are also present in the groundwater.

Goal: Reach Maximum Contaminant Levels (MCLs) in core monitoring wells within 30 years for the Upper Glacial aquifer (by 2030). NYSDEC and EPA approved of the Petition for Closure in August 2018 and March 2019, respectively.

Start Date: May 1997

Table 10-1
OU III HFBR Pump and Recharge System
Pumping Rates (gpm)

Extraction Well	**EW-9**	**EW-10**	**EW-11**	**EW-16**
Site Id #	105-40	105-39	105-41	096-119
Screen Interval (ft bls)	130-150	130-150	130-150	80-120
Desired Flow Rate (gpm)	0 *	0 *	0 *	0 *
July (Avg monthly gpm)	0	0	0	0
August "	0	0	0	0
September "	0	0	0	0
Actual (Avg. over Qtr.)	**0**	**0**	**0**	**0**

* The system was approved for closure in March 2019.

Figure 10-1
OU III HFBR Pump & Treat System
Extraction Wells Tritium Concentrations vs. Time

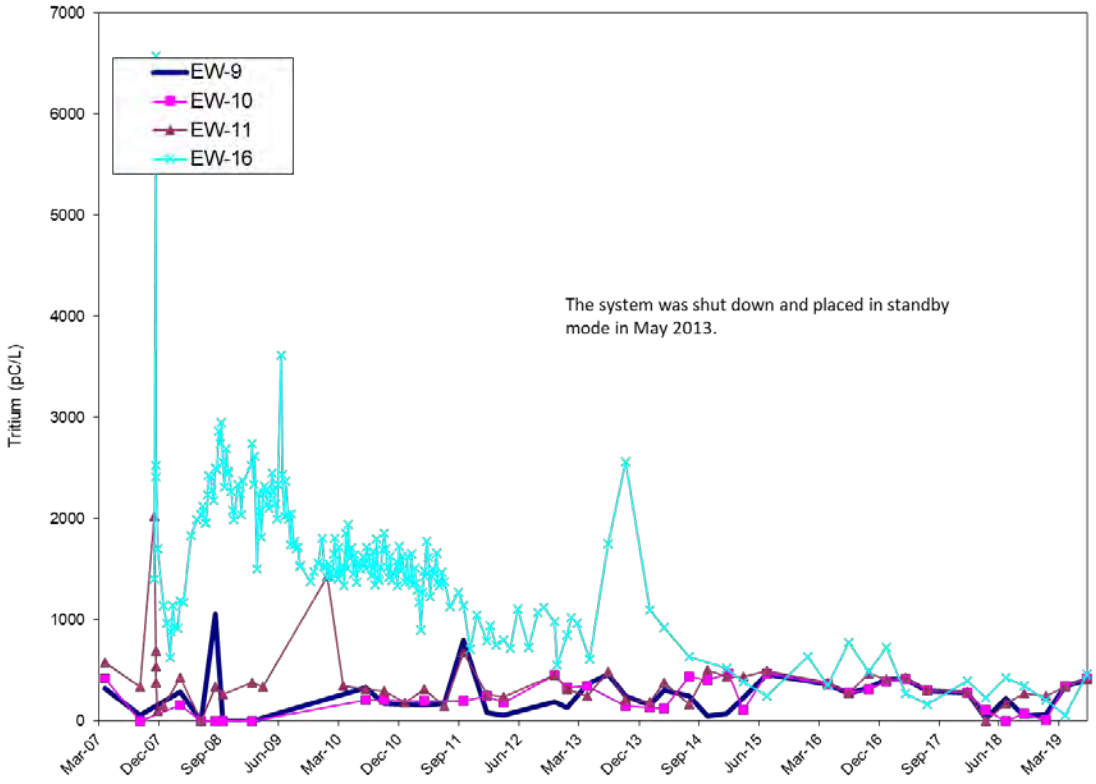


Table 10-2
Effluent Water Quality
SPDES Equivalency Permit Concentrations July 1, 2019 – September 30, 2019

Parameter	Permit Limit	Max. Measured Value	Units	Frequency
Flow	**Monitor**	**NA**	**GPD**	**Continuous**
pH (range)	**5.6 - 8.5**	**NA**	**SU**	**Weekly**
Carbon Tetrachloride	**5.0**	**NA**	**ug/L**	**2/Month**
Chloroform	**7.0**	**NA**	**ug/L**	**2/Month**
1,1-Dichloroethane	**5.0**	**NA**	**ug/L**	**2/Month**

Parameter	Permit Limit	Max. Measured Value	Units	Frequency
1,2-Dichloroethane	**0.6**	**NA**	**ug/L**	**2/Month**
1,1-Dichloroethene	**5.0**	**NA**	**ug/L**	**2/Month**
Cis-1,2-Dichloroethylene	**5.0**	**NA**	**ug/L**	**2/Month**
trans-1,2-Dichloroethylene	**5.0**	**NA**	**ug/L**	**2/Month**
Tetrachloroethylene	**5.0**	**NA**	**ug/L**	**2/Month**
1,1,1-Trichloroethane	**5.0**	**NA**	**ug/L**	**2/Month**
Trichloroethylene	**5.0**	**NA**	**ug/L**	**2/Month**

NA = Not applicable. The system is closed.

Monitoring Activities

The current monitoring well network is depicted on Figure 10-1. The third quarter monitoring well analytical results are shown on Table 10-3.

The highest tritium concentration immediately downgradient of the HFBR in the third quarter of 2019 was 15,500 pCi/L in well 075-806. This well is located on the lawn of the HFBR immediately north of Cornell Avenue.

The extraction wells associated with this system, EW-9, EW-10, EW-11, and EW-16 were sampled on a quarterly basis through July 2019. They were then discontinued since the regulators approved closure of the system. The detections for these wells for the third quarter are presented in Table 10-4. During this sampling round, tritium was not detected in any of the extraction wells.

System Operations

July 2019:

The system remained in standby mode.

August 2019:

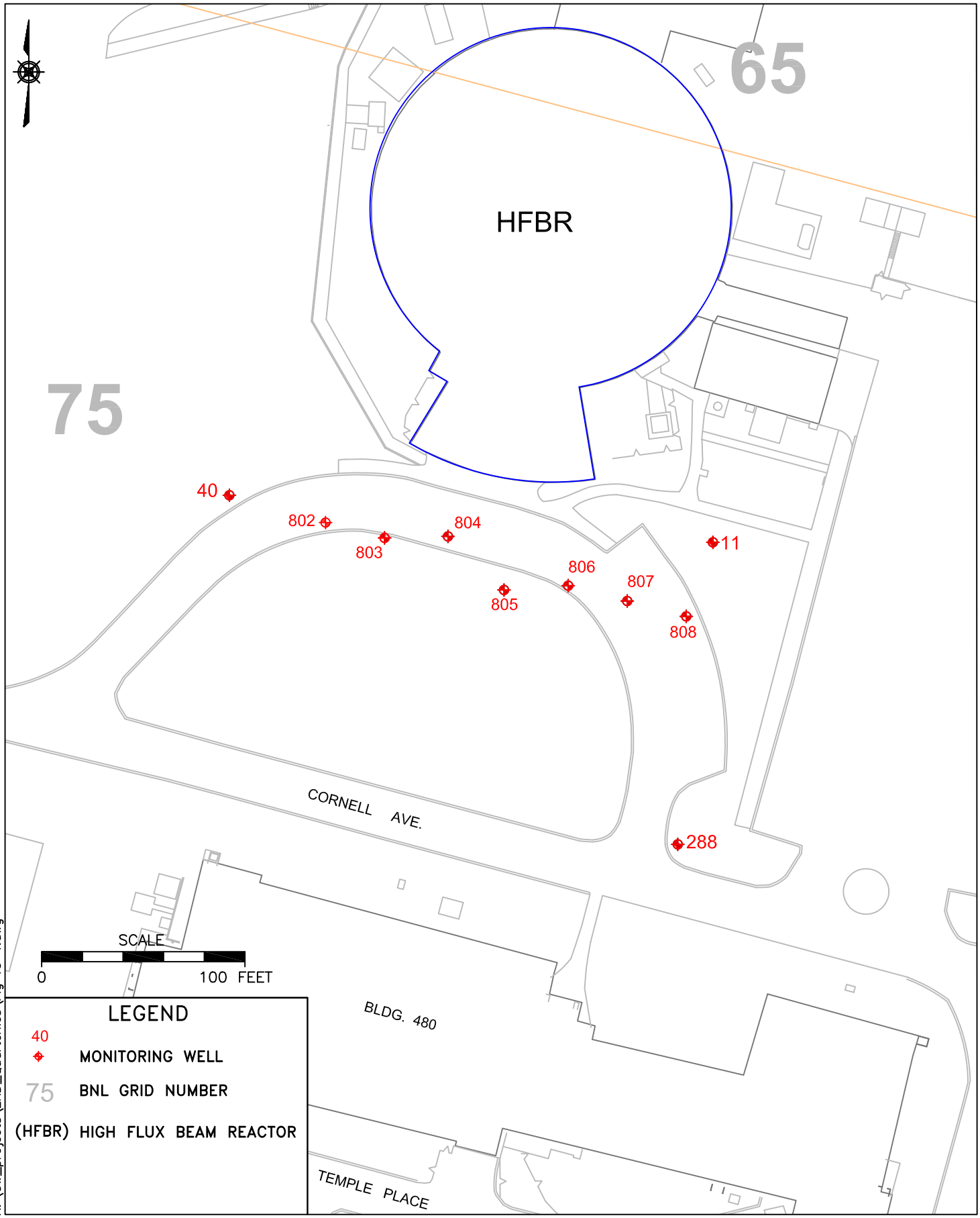
The system remained in standby mode.

September 2019:

The system remained in standby mode.

Planned Operational Changes

- The source area monitoring data will continue to be documented in the annual Groundwater Status Report.



R:\Gw_projects\ERD_Quarterlies\Fig 10-1.dwg

BROOKHAVEN NATIONAL LABORATORY
ENVIRONMENTAL PROTECTION DIVISION

TITLE:

OU III HFBR AOC 29, THIRD QUARTER 2019 OPERATIONS REPORT

DWN:	VT:HZ.:	DATE:	PROJECT NO.:
AJZ	–	06/14/18	–
CHKD:	APPD:	REV.:	NOTES:
JEB	RH	11/18/19	–

FIGURE NO.: 10-1

Table 10-3
OU III HFBR Tritium Plume Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 075-803

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Tritium	07/01/2019	4760	377	446	PCI/L	49.57	

Site ID : 075-804

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Tritium	07/01/2019	6790	345	490	PCI/L	49.95	

Site ID : 075-805

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Tritium	07/01/2019	5660	335	448	PCI/L	49.63	

Site ID : 075-806

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Tritium	07/01/2019	15500	340	704	PCI/L	49.22	

Site ID : 105-23

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/16/2019	0.59	0.5	--	UG/L	180.00	
1,1-Dichloroethane	07/16/2019	0.15	0.5	--	UG/L	180.00	J
1,1-Dichloroethylene	07/16/2019	0.77	0.5	--	UG/L	180.00	
524.2 TVOC	07/16/2019	18.41	--	--	UG/L	180.00	
Carbon tetrachloride	07/16/2019	0.19	0.5	--	UG/L	180.00	J
Chloroform	07/16/2019	0.36	0.5	--	UG/L	180.00	J
Tetrachloroethylene	07/16/2019	16	0.5	--	UG/L	180.00	
Trichloroethylene	07/16/2019	0.35	0.5	--	UG/L	180.00	J

Table 10-4
OU III HFBR Tritium Plume Extraction Well Data
'Hits Only' July through September 2019

Site ID : 096-119 (EW-16)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/17/2019	0.48	--	--	UG/L	100.00	
Chloroform	07/17/2019	0.48	0.5	--	UG/L	100.00	J

Site ID : 105-39 (EW-10)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/17/2019	0.54	--	--	UG/L	140.00	
Chloroform	07/17/2019	0.31	0.5	--	UG/L	140.00	J
Tetrachloroethylene	07/17/2019	0.23	0.5	--	UG/L	140.00	J

Site ID : 105-40 (EW-9)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,2,3-Trichlorobenzene	07/17/2019	0.22	0.5	--	UG/L	140.00	BJ
524.2 TVOC	07/17/2019	0.96	--	--	UG/L	140.00	
Chloroform	07/17/2019	0.33	0.5	--	UG/L	140.00	J
Tetrachloroethylene	07/17/2019	0.41	0.5	--	UG/L	140.00	J

Site ID : 105-41 (EW-11)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/17/2019	0.71	--	--	UG/L	140.00	
Chloroform	07/17/2019	0.5	0.5	--	UG/L	140.00	
Tetrachloroethylene	07/17/2019	0.21	0.5	--	UG/L	140.00	J

Qualifiers :

J = Estimated value.
D = Compound was identified in an analysis at a secondary dilution factor.

Organic Compounds :

B = Compound was found in both the sample And associated laboratory blank.

Inorganic Compounds :

B = Result Is between instrument detection limit And contract required reporting limit.

Section 11

Q3-2019 Operations Summary
OU III Western South Boundary Pump & Treat System

Process: Groundwater extraction and air stripping treatment, with discharge to the Western South Boundary recharge basin

Goal: Reach Maximum Contaminant Levels (MCLs) in core monitoring wells in OU III within 30 years for the Upper Glacial aquifer (by 2030).

Start Date: September 2002

Table 11-1
OU III Western South Boundary Pump & Treat System
Pumping Rates (gpm)

Extraction Well	WSB-1	WSB-2	WSB-3	WSB-4	WSB-5	WSB-6
Site ID #	126-12	127-05	111-17	119-13	130-12	130-13
Screen Interval (ft bls)	140-160	150-170	168-188	170-190	160-190	196-216
Desired Flow Rate (GPM)	180	150	75	75	75	75
July	93	0	58	39	59	53
August	41	0	27	19	26	27
September	69	0	45	36	41	46
Actual (Avg. over Qtr.)	**68**	**0**	**43**	**31**	**42**	**42**

Extraction well WSB-2 is in standby mode. Extraction wells WSB-3 through WSB-6 became operational in March 2019.

Figure 11-1
OU III Western South Boundary Pump & Treat System
Cumulative Mass Removal of VOCs vs. Time

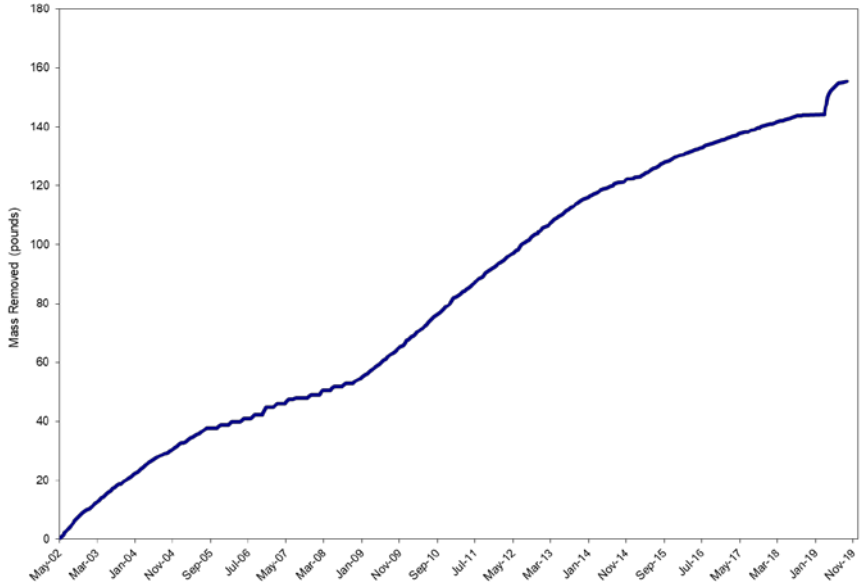


Figure 11-2
OU III Western South Boundary Pump & Treat System
Influent TVOC Concentrations vs. Time

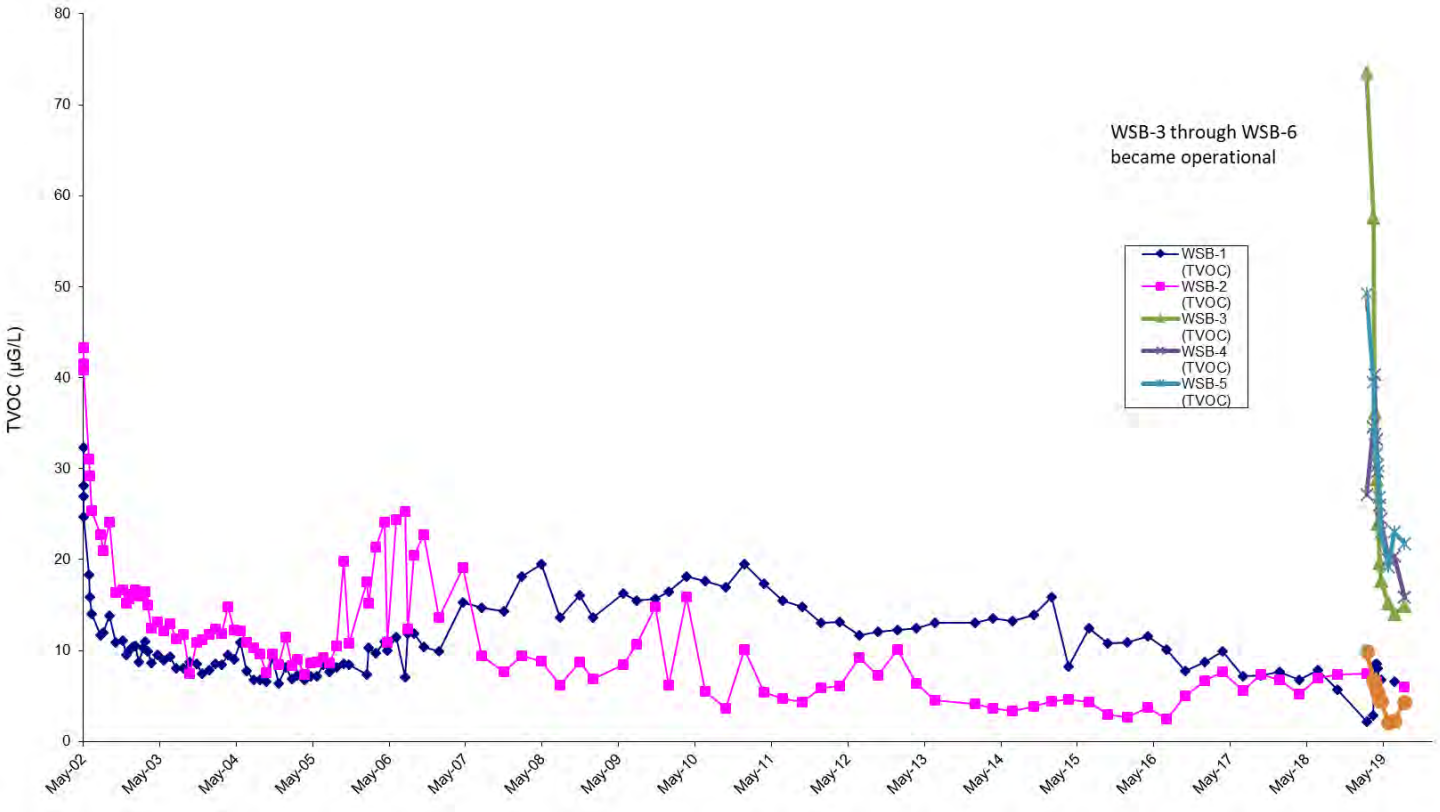


Table 11-2
Effluent Water Quality
SPDES Equivalency Permit Concentrations July 1, 2019 – September 30, 2019

Parameter	Permit Limit	Max. Measured Value	Units	Frequency
Flow	**Monitor**	**419,677 [1]**	**GPD**	**Continuous**
pH (range)	**6.5 - 8.5**	**7.0 – 7.5**	**SU**	**Monthly**
Carbon Tetrachloride	**5**	**<0.50**	**ug/L**	**2/Month**
Chloroform	**7**	**<0.50**	**ug/L**	**2/Month**
Dichlorodifluoromethane	**5**	**<0.50**	**ug/L**	**2/Month**
1,1-Dichloroethane	**5**	**<0.50**	**ug/L**	**2/Month**
1,1-Dichloroethylene	**5**	**<0.50**	**ug/L**	**2/Month**
Methyl Chloride	**5**	**<0.50**	**ug/L**	**2/Month**
Tetrachloroethylene	**5**	**<0.50**	**ug/L**	**2/Month**
Toluene	**5**	**<0.50**	**ug/L**	**2/Month**
1,1,1-Trichloroethane	**5**	**<0.50**	**ug/L**	**2/Month**
1,1,2-Tricholorethane	**5**	**<0.50**	**ug/L**	**2/Month**
Trichloroethylene	**10**	**<0.50**	**ug/L**	**2/Month**

[1] The average flow for the operational period at the influent flow meter.
Note: As of March 2019, the water from the Western South Boundary is treated at the OU III South Boundary/Middle Road air stripper towers and discharged under that equivalency permit. This change in discharge location was reflected starting with the April DMR.

System Operations

July 2019:

Extraction well WSB-1, WSB-3, WSB-4, WSB-5, WSB-6 were running normally. The system was off for one week for maintenance. Extraction well WSB-2 was in standby mode. The system treated approximately 13 million gallons of water.

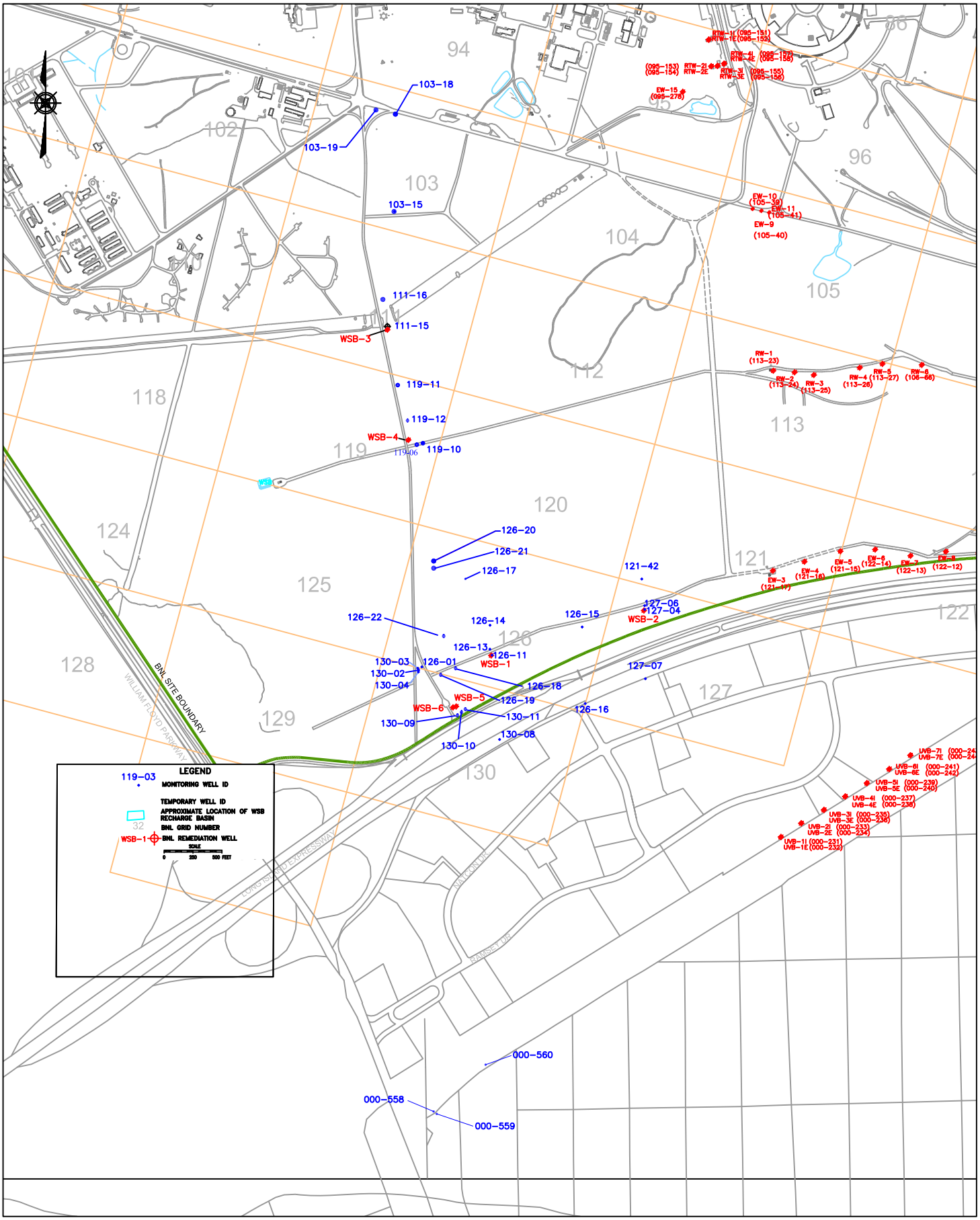
August 2019:
Extraction well WSB-1, WSB-3, WSB-4, WSB-5, WSB-6 were running normally. The system was off for two weeks for maintenance. Extraction well WSB-2 was in standby mode. The system treated approximately 6 million gallons of water.

September 2019:
Extraction well WSB-1, WSB-3, WSB-4, WSB-5, WSB-6 were running normally. The system was off for 10 days for maintenance. Extraction well WSB-2 was in standby mode. The system treated approximately 10 million gallons of water.

The system treated approximately 29 million gallons of water during the third quarter of 2019.

Planned Operational Changes

- Continue full-time operation of extraction well WSB-1 based on elevated concentrations persisting at well 126-14.
- Continue full time operation of extraction wells WSB-3 through WSB-6.
- Based on the low TVOC concentrations below the capture goal of 20 µg/L, maintain extraction well WSB-2 in standby mode. If TVOC concentrations greater than 20 µg/L are observed in WSB-2 or the adjacent core monitoring wells, extraction well WSB-2 may be put into full time operation. During the third quarter, WSB-2 and adjacent monitoring wells were below the TVOC capture goal of 20 µg/L.



\\OERNT\GIS\GW_PROJECTS\ERD QUARTERLIES\3Q_2019\FIG 11-3.DWG

BROOKHAVEN NATIONAL LABORATORY

ENVIRONMENTAL PROTECTION DIVISION

OU III WESTERN SOUTH BOUNDARY PUMP AND TREAT SYSTEM MONITORING WELL LOCATIONS

SITEWIDE REMEDIATION SYSTEMS
THIRD QUARTER 2019 OPERATIONS REPORT

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
JEB	–	09/26/05	–
CHKD:	APPD:	REV.:	NOTES:
BH	– –	11/23/19	–

FIGURE NO.: 11-3

Table 11-3
OU III Western South Boundary Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 000-558

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/13/2019	2.9	0.5	--	UG/L	165.00	
1,1-Dichloroethane	08/13/2019	0.8	0.5	--	UG/L	165.00	
1,1-Dichloroethylene	08/13/2019	2.5	0.5	--	UG/L	165.00	
524.2 TVOC	08/13/2019	15.49	--	--	UG/L	165.00	
Carbon tetrachloride	08/13/2019	0.4	0.5	--	UG/L	165.00	J
Chloroform	08/13/2019	4.2	0.5	--	UG/L	165.00	
Dichlorodifluoromethane	08/13/2019	0.99	0.5	--	UG/L	165.00	
Trichloroethylene	08/13/2019	3.7	0.5	--	UG/L	165.00	

Site ID : 000-559

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/13/2019	0.71	--	--	UG/L	215.00	
Dichlorodifluoromethane	08/13/2019	0.71	0.5	--	UG/L	215.00	

Site ID : 000-560

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/13/2019	1.7	0.5	--	UG/L	159.50	
1,1-Dichloroethane	08/13/2019	0.6	0.5	--	UG/L	159.50	
1,1-Dichloroethylene	08/13/2019	2.1	0.5	--	UG/L	159.50	
524.2 TVOC	08/13/2019	10.19	--	--	UG/L	159.50	
Carbon tetrachloride	08/13/2019	0.41	0.5	--	UG/L	159.50	J
Chloroform	08/13/2019	1.9	0.5	--	UG/L	159.50	
Dichlorodifluoromethane	08/13/2019	2.6	0.5	--	UG/L	159.50	
Trichloroethylene	08/13/2019	0.88	0.5	--	UG/L	159.50	

Site ID : 103-15

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1-Dichloroethane	08/05/2019	5.2	0.5	--	UG/L	200.00	
1,1-Dichloroethylene	08/05/2019	4.5	0.5	--	UG/L	200.00	
524.2 TVOC	08/05/2019	19.3	--	--	UG/L	200.00	
Dichlorodifluoromethane	08/05/2019	4.6	0.5	--	UG/L	200.00	
Trichloroethylene	08/05/2019	5	0.5	--	UG/L	200.00	

Site ID : 103-18

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1-Dichloroethane	08/05/2019	1.4	0.5	--	UG/L	170.00	
1,1-Dichloroethylene	08/05/2019	1.8	0.5	--	UG/L	170.00	

Table 11-3
OU III Western South Boundary Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 103-18

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/05/2019	9.1	--	--	UG/L	170.00	
Dichlorodifluoromethane	08/05/2019	3.4	0.5	--	UG/L	170.00	
Trichloroethylene	08/05/2019	2.5	0.5	--	UG/L	170.00	

Site ID : 103-19

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1-Dichloroethane	08/05/2019	1	0.5	--	UG/L	170.00	
1,1-Dichloroethylene	08/05/2019	1.1	0.5	--	UG/L	170.00	
524.2 TVOC	08/05/2019	6.62	--	--	UG/L	170.00	
cis-1,2-Dichloroethylene	08/05/2019	0.12	0.5	--	UG/L	170.00	J
Dichlorodifluoromethane	08/05/2019	1.7	0.5	--	UG/L	170.00	
Trichloroethylene	08/05/2019	2.7	0.5	--	UG/L	170.00	

Site ID : 111-15

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/05/2019	0.82	0.5	--	UG/L	175.00	
1,1-Dichloroethane	08/05/2019	0.49	0.5	--	UG/L	175.00	J
1,1-Dichloroethylene	08/05/2019	2	0.5	--	UG/L	175.00	
524.2 TVOC	08/05/2019	4.03	--	--	UG/L	175.00	
Tetrachloroethylene	08/05/2019	0.21	0.5	--	UG/L	175.00	J
Trichloroethylene	08/05/2019	0.51	0.5	--	UG/L	175.00	

Site ID : 111-16

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/05/2019	1.2	0.5	--	UG/L	173.00	
1,1-Dichloroethane	08/05/2019	1.5	0.5	--	UG/L	173.00	
1,1-Dichloroethylene	08/05/2019	3.3	0.5	--	UG/L	173.00	
524.2 TVOC	08/05/2019	7.54	--	--	UG/L	173.00	
Dichlorodifluoromethane	08/05/2019	0.43	0.5	--	UG/L	173.00	J
Tetrachloroethylene	08/05/2019	0.29	0.5	--	UG/L	173.00	J
Trichloroethylene	08/05/2019	0.82	0.5	--	UG/L	173.00	

Site ID : 119-06

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/06/2019	0	--	--	UG/L	130.00	

Site ID : 119-10

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/06/2019	0.38	0.5	--	UG/L	200.00	J

Table 11-3
OU III Western South Boundary Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 119-10

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1-Dichloroethane	08/06/2019	2.7	0.5	--	UG/L	200.00	
1,1-Dichloroethylene	08/06/2019	1.9	0.5	--	UG/L	200.00	
524.2 TVOC	08/06/2019	9.7	--	--	UG/L	200.00	
cis-1,2-Dichloroethylene	08/06/2019	0.12	0.5	--	UG/L	200.00	J
Dichlorodifluoromethane	08/06/2019	3	0.5	--	UG/L	200.00	
Trichloroethylene	08/06/2019	1.6	0.5	--	UG/L	200.00	

Site ID : 119-11

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1-Dichloroethylene	08/05/2019	46	2.5	--	UG/L	180.00	
524.2 TVOC	08/05/2019	72.67	--	--	UG/L	180.00	

Site ID : 119-12

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/06/2019	1.8	0.5	--	UG/L	179.00	
1,1-Dichloroethane	08/06/2019	2.6	0.5	--	UG/L	179.00	
1,1-Dichloroethylene	08/06/2019	5.3	0.5	--	UG/L	179.00	
524.2 TVOC	08/06/2019	14.83	--	--	UG/L	179.00	
Dichlorodifluoromethane	08/06/2019	0.73	0.5	--	UG/L	179.00	
Trichloroethylene	08/06/2019	4.4	0.5	--	UG/L	179.00	

Site ID : 126-14

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/07/2019	48.2	2	--	UG/L	155.00	
1,1-Dichloroethylene	08/07/2019	49.3	2	--	UG/L	155.00	
524.2 TVOC	08/07/2019	104.35	--	--	UG/L	155.00	

Site ID : 126-16

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/12/2019	2.61	0.5	--	UG/L	135.00	
1,1-Dichloroethane	08/12/2019	1.3	0.5	--	UG/L	135.00	
1,1-Dichloroethylene	08/12/2019	4.03	0.5	--	UG/L	135.00	
524.2 TVOC	08/12/2019	18.99	--	--	UG/L	135.00	
Chloroform	08/12/2019	3.74	0.5	--	UG/L	135.00	
Dichlorodifluoromethane	08/12/2019	3.76	0.5	--	UG/L	135.00	
Tetrachloroethylene	08/12/2019	0.24	0.5	--	UG/L	135.00	J
Trichloroethylene	08/12/2019	3.31	0.5	--	UG/L	135.00	

Table 11-3
OU III Western South Boundary Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 126-17

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/09/2019	0.39	0.5	--	UG/L	140.00	J
1,1-Dichloroethylene	08/09/2019	0.32	0.5	--	UG/L	140.00	J
524.2 TVOC	08/09/2019	0.71	--	--	UG/L	140.00	

Site ID : 126-18

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/09/2019	45	2.5	--	UG/L	165.00	
1,1-Dichloroethylene	08/09/2019	50	2.5	--	UG/L	165.00	
524.2 TVOC	08/09/2019	97.66	--	--	UG/L	165.00	

Site ID : 126-19

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/06/2019	1.4	0.5	--	UG/L	195.00	
1,1-Dichloroethane	08/06/2019	1.2	0.5	--	UG/L	195.00	
1,1-Dichloroethylene	08/06/2019	2.9	0.5	--	UG/L	195.00	
524.2 TVOC	08/06/2019	27.28	--	--	UG/L	195.00	
Chloroform	08/06/2019	0.78	0.5	--	UG/L	195.00	
Dichlorodifluoromethane	08/06/2019	21	0.5	--	UG/L	195.00	

Site ID : 126-20

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/12/2019	20	0.5	--	UG/L	140.00	
1,1-Dichloroethane	08/12/2019	0.29	0.5	--	UG/L	140.00	J
1,1-Dichloroethylene	08/12/2019	19	0.5	--	UG/L	140.00	
1,2-Dichloroethane	08/12/2019	0.38	0.5	--	UG/L	140.00	J
524.2 TVOC	08/12/2019	41.72	--	--	UG/L	140.00	
Chloroform	08/12/2019	0.68	0.5	--	UG/L	140.00	
Tetrachloroethylene	08/12/2019	0.37	0.5	--	UG/L	140.00	J
Trichloroethylene	08/12/2019	1	0.5	--	UG/L	140.00	

Site ID : 126-21

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/12/2019	0.72	0.5	--	UG/L	204.00	
1,1-Dichloroethane	08/12/2019	0.21	0.5	--	UG/L	204.00	J
1,1-Dichloroethylene	08/12/2019	0.88	0.5	--	UG/L	204.00	
524.2 TVOC	08/12/2019	2.39	--	--	UG/L	204.00	
Chloroform	08/12/2019	0.28	0.5	--	UG/L	204.00	J

Table 11-3
OU III Western South Boundary Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 126-21

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Dichlorodifluoromethane	08/12/2019	0.3	0.5	--	UG/L	204.00	J

Site ID : 126-22

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/08/2019	0.44	0.5	--	UG/L	208.00	J
1,1-Dichloroethane	08/08/2019	0.41	0.5	--	UG/L	208.00	J
1,1-Dichloroethylene	08/08/2019	0.63	0.5	--	UG/L	208.00	
524.2 TVOC	08/08/2019	11.11	--	--	UG/L	208.00	
Chloroform	08/08/2019	0.33	0.5	--	UG/L	208.00	J
Dichlorodifluoromethane	08/08/2019	9.3	0.5	--	UG/L	208.00	

Site ID : 127-07

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/12/2019	0.38	--	--	UG/L	151.00	
Tetrachloroethylene	08/12/2019	0.18	0.5	--	UG/L	151.00	J
Trichloroethylene	08/12/2019	0.2	0.5	--	UG/L	151.00	J

Site ID : 130-08

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/12/2019	1.44	--	--	UG/L	150.00	
Chloroform	08/12/2019	0.51	0.5	--	UG/L	150.00	
Tetrachloroethylene	08/12/2019	0.38	0.5	--	UG/L	150.00	J
Trichloroethylene	08/12/2019	0.55	0.5	--	UG/L	150.00	

Site ID : 130-09

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/12/2019	0.51	--	--	UG/L	140.00	
Chloroform	08/12/2019	0.51	0.5	--	UG/L	140.00	

Site ID : 130-10

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/12/2019	0.26	0.5	--	UG/L	155.00	J
1,1-Dichloroethylene	08/12/2019	0.23	0.5	--	UG/L	155.00	J
524.2 TVOC	08/12/2019	0.79	--	--	UG/L	155.00	
Chloroform	08/12/2019	0.3	0.5	--	UG/L	155.00	J

Site ID : 130-11

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/12/2019	0.71	0.5	--	UG/L	200.00	

Table 11-3
OU III Western South Boundary Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 130-11

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1-Dichloroethane	08/12/2019	0.54	0.5	--	UG/L	200.00	
1,1-Dichloroethylene	08/12/2019	1	0.5	--	UG/L	200.00	
524.2 TVOC	08/12/2019	12.74	--	--	UG/L	200.00	
Chloroform	08/12/2019	0.93	0.5	--	UG/L	200.00	
Dichlorodifluoromethane	08/12/2019	9.1	0.5	--	UG/L	200.00	
Trichloroethylene	08/12/2019	0.46	0.5	--	UG/L	200.00	J

Table 11-4
OU III Western South Boundary Extraction Well Data
'Hits Only' July through September 2019

Site ID : 111-17 (WSB-3)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/03/2019	3.6	0.5	--	UG/L	0.00	
1,1-Dichloroethane	07/03/2019	1.3	0.5	--	UG/L	0.00	
1,1-Dichloroethylene	07/03/2019	7.3	0.5	--	UG/L	0.00	
524.2 TVOC	07/03/2019	13.99	--	--	UG/L	0.00	
Chloroform	07/03/2019	0.69	0.5	--	UG/L	0.00	
Trichloroethylene	07/03/2019	1.1	0.5	--	UG/L	0.00	
1,1,1-Trichloroethane	08/20/2019	2.6	0.5	--	UG/L	0.00	
1,1-Dichloroethane	08/20/2019	1.8	0.5	--	UG/L	0.00	
1,1-Dichloroethylene	08/20/2019	9.1	0.5	--	UG/L	0.00	
524.2 TVOC	08/20/2019	14.9	--	--	UG/L	0.00	
Chloroform	08/20/2019	0.48	0.5	--	UG/L	0.00	J
Trichloroethylene	08/20/2019	0.92	0.5	--	UG/L	0.00	
1,1,1-Trichloroethane	09/04/2019	2.9	0.5		UG/L	0.00	
1,1-Dichloroethane	09/04/2019	1	0.5		UG/L	0.00	
1,1-Dichloroethylene	09/04/2019	5.5	0.5		UG/L	0.00	
524.2 TVOC	09/04/2019	10.92	--		UG/L	0.00	
Chloroform	09/04/2019	0.56	0.5		UG/L	0.00	
Trichloroethylene	09/04/2019	0.96	0.5		UG/L	0.00	
1,4-Dioxane	09/18/2019	3.81	0.2	--	UG/L	0.00	

Site ID : 119-13 (WSB-4)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/03/2019	7.1	0.5	--	UG/L	0.00	
1,1-Dichloroethane	07/03/2019	0.89	0.5	--	UG/L	0.00	
1,1-Dichloroethylene	07/03/2019	10	0.5	--	UG/L	0.00	
524.2 TVOC	07/03/2019	20.42	--	--	UG/L	0.00	
Chloroform	07/03/2019	0.83	0.5	--	UG/L	0.00	
Trichloroethylene	07/03/2019	1.6	0.5	--	UG/L	0.00	
1,1,1-Trichloroethane	08/20/2019	5.5	0.5	--	UG/L	0.00	
1,1-Dichloroethane	08/20/2019	1.1	0.5	--	UG/L	0.00	
1,1-Dichloroethylene	08/20/2019	6.5	0.5	--	UG/L	0.00	
524.2 TVOC	08/20/2019	15.83	--	--	UG/L	0.00	
Chloroform	08/20/2019	0.61	0.5	--	UG/L	0.00	
Dichlorodifluoromethane	08/20/2019	0.52	0.5	--	UG/L	0.00	

Table 11-4
OU III Western South Boundary Extraction Well Data
'Hits Only' July through September 2019

Site ID : 119-13 (WSB-4)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Trichloroethylene	08/20/2019	1.6	0.5	--	UG/L	0.00	
1,1,1-Trichloroethane	09/04/2019	6	0.5		UG/L	0.00	
1,1-Dichloroethane	09/04/2019	0.71	0.5		UG/L	0.00	
1,1-Dichloroethylene	09/04/2019	7.1	0.5		UG/L	0.00	
524.2 TVOC	09/04/2019	16.13	--		UG/L	0.00	
Chloroform	09/04/2019	0.61	0.5		UG/L	0.00	
Dichlorodifluoromethane	09/04/2019	0.41	0.5		UG/L	0.00	J
Trichloroethylene	09/04/2019	1.3	0.5		UG/L	0.00	
1,4-Dioxane	09/18/2019	7.64	0.2	--	UG/L	0.00	

Site ID : 126-12 (WSB-1)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/03/2019	2.4	0.5	--	UG/L	0.00	
1,1-Dichloroethylene	07/03/2019	2.5	0.5	--	UG/L	0.00	
524.2 TVOC	07/03/2019	6.53	--	--	UG/L	0.00	
Chloroform	07/03/2019	0.97	0.5	--	UG/L	0.00	
Trichloroethylene	07/03/2019	0.66	0.5	--	UG/L	0.00	
1,4-Dioxane	09/18/2019	2.99	0.2	--	UG/L	0.00	

Site ID : 127-05 (WSB-2)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/20/2019	1.1	0.5	--	UG/L	0.00	
1,1-Dichloroethane	08/20/2019	0.39	0.5	--	UG/L	0.00	J
1,1-Dichloroethylene	08/20/2019	0.83	0.5	--	UG/L	0.00	
524.2 TVOC	08/20/2019	5.99	--	--	UG/L	0.00	
Carbon tetrachloride	08/20/2019	0.37	0.5	--	UG/L	0.00	J
Chloroform	08/20/2019	1.1	0.5	--	UG/L	0.00	
Trichloroethylene	08/20/2019	2.2	0.5	--	UG/L	0.00	
1,4-Dioxane	09/18/2019	5.38	0.2	--	UG/L	0.00	

Site ID : 130-12 (WSB-5)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/03/2019	7.3	0.5	--	UG/L	0.00	
1,1-Dichloroethane	07/03/2019	0.78	0.5	--	UG/L	0.00	
1,1-Dichloroethylene	07/03/2019	4.7	0.5	--	UG/L	0.00	
524.2 TVOC	07/03/2019	22.98	--	--	UG/L	0.00	

Table 11-4
OU III Western South Boundary Extraction Well Data
'Hits Only' July through September 2019

Site ID : 130-12 (WSB-5)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Chloroform	07/03/2019	3.9	0.5	--	UG/L	0.00	
Dichlorodifluoromethane	07/03/2019	4	0.5	--	UG/L	0.00	
Trichloroethylene	07/03/2019	2.3	0.5	--	UG/L	0.00	
1,1,1-Trichloroethane	08/20/2019	5	0.5	--	UG/L	0.00	
1,1-Dichloroethane	08/20/2019	0.78	0.5	--	UG/L	0.00	
1,1-Dichloroethylene	08/20/2019	5.3	0.5	--	UG/L	0.00	
524.2 TVOC	08/20/2019	21.77	--	--	UG/L	0.00	
Carbon tetrachloride	08/20/2019	0.39	0.5	--	UG/L	0.00	J
Chloroform	08/20/2019	3.1	0.5	--	UG/L	0.00	
Dichlorodifluoromethane	08/20/2019	5.1	0.5	--	UG/L	0.00	
Trichloroethylene	08/20/2019	2.1	0.5	--	UG/L	0.00	
1,1,1-Trichloroethane	09/04/2019	8.9	0.5		UG/L	0.00	
1,1-Dichloroethane	09/04/2019	0.52	0.5		UG/L	0.00	
1,1-Dichloroethylene	09/04/2019	6.9	0.5		UG/L	0.00	
524.2 TVOC	09/04/2019	24.5	--		UG/L	0.00	
Carbon tetrachloride	09/04/2019	0.38	0.5		UG/L	0.00	J
Chloroform	09/04/2019	2.7	0.5		UG/L	0.00	
Dichlorodifluoromethane	09/04/2019	3.2	0.5		UG/L	0.00	
Trichloroethylene	09/04/2019	1.9	0.5		UG/L	0.00	
1,4-Dioxane	09/18/2019	6.04	0.2	--	UG/L	0.00	

Site ID : 130-13 (WSB-6)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/03/2019	2.3	--	--	UG/L	0.00	
Dichlorodifluoromethane	07/03/2019	2.3	0.5	--	UG/L	0.00	
1,1-Dichloroethane	08/20/2019	0.33	0.5	--	UG/L	0.00	J
1,1-Dichloroethylene	08/20/2019	0.24	0.5	--	UG/L	0.00	J
524.2 TVOC	08/20/2019	4.37	--	--	UG/L	0.00	
Dichlorodifluoromethane	08/20/2019	3.6	0.5	--	UG/L	0.00	
Methyl chloride	08/20/2019	0.2	0.5	--	UG/L	0.00	J
1,1-Dichloroethane	09/04/2019	0.28	0.5		UG/L	0.00	J
1,1-Dichloroethylene	09/04/2019	0.19	0.5		UG/L	0.00	J
524.2 TVOC	09/04/2019	2.67	--		UG/L	0.00	
Dichlorodifluoromethane	09/04/2019	2.2	0.5		UG/L	0.00	

Table 11-4
OU III Western South Boundary Extraction Well Data
'Hits Only' July through September 2019

Site ID : 130-13 (WSB-6)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,4-Dioxane	09/18/2019	4.05	0.2	--	UG/L	0.00	

Table 11-5
OU III Western South Boundary Influent Data
'Hits Only' July through September 2019

Site ID : 121-55 (System Influent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/03/2019	3.5	0.5	--	UG/L	0.00	
1,1-Dichloroethane	07/03/2019	0.56	0.5	--	UG/L	0.00	
1,1-Dichloroethylene	07/03/2019	5.2	0.5	--	UG/L	0.00	
524.2 TVOC	07/03/2019	12.72	--	--	UG/L	0.00	
Chloroform	07/03/2019	1.2	0.5	--	UG/L	0.00	
Dichlorodifluoromethane	07/03/2019	1.3	0.5	--	UG/L	0.00	
Trichloroethylene	07/03/2019	0.96	0.5	--	UG/L	0.00	
1,1,1-Trichloroethane	07/18/2019	3.4	0.5	--	UG/L	0.00	
1,1-Dichloroethane	07/18/2019	0.53	0.5	--	UG/L	0.00	
1,1-Dichloroethylene	07/18/2019	4.9	0.5	--	UG/L	0.00	
524.2 TVOC	07/18/2019	12.03	--	--	UG/L	0.00	
Chloroform	07/18/2019	1.1	0.5	--	UG/L	0.00	
Dichlorodifluoromethane	07/18/2019	1.1	0.5	--	UG/L	0.00	
Trichloroethylene	07/18/2019	1	0.5	--	UG/L	0.00	
1,1,1-Trichloroethane	08/20/2019	4	0.5	--	UG/L	0.00	
1,1-Dichloroethane	08/20/2019	0.59	0.5	--	UG/L	0.00	
1,1-Dichloroethylene	08/20/2019	5	0.5	--	UG/L	0.00	
524.2 TVOC	08/20/2019	12.77	--	--	UG/L	0.00	
Chloroform	08/20/2019	0.9	0.5	--	UG/L	0.00	
Dichlorodifluoromethane	08/20/2019	1.4	0.5	--	UG/L	0.00	
Trichloroethylene	08/20/2019	0.88	0.5	--	UG/L	0.00	
1,1,1-Trichloroethane	09/04/2019	3.7	0.5		UG/L	0.00	
1,1-Dichloroethane	09/04/2019	0.48	0.5		UG/L	0.00	J
1,1-Dichloroethylene	09/04/2019	4.3	0.5		UG/L	0.00	
524.2 TVOC	09/04/2019	11.4	--		UG/L	0.00	
Chloroform	09/04/2019	0.92	0.5		UG/L	0.00	
Dichlorodifluoromethane	09/04/2019	1.1	0.5		UG/L	0.00	
Trichloroethylene	09/04/2019	0.9	0.5		UG/L	0.00	
1,1,1-Trichloroethane	09/18/2019	2.6	0.5	--	UG/L	0.00	
1,1-Dichloroethane	09/18/2019	0.42	0.5	--	UG/L	0.00	J
1,1-Dichloroethylene	09/18/2019	3.7	0.5	--	UG/L	0.00	
1,4-Dioxane	09/18/2019	4.6	0.2	--	UG/L	0.00	
524.2 TVOC	09/18/2019	9.75	--	--	UG/L	0.00	

Table 11-5
OU III Western South Boundary Influent Data
'Hits Only' July through September 2019

Site ID : 121-55 (System Influent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Chloroform	09/18/2019	0.99	0.5	--	UG/L	0.00	
Dichlorodifluoromethane	09/18/2019	0.84	0.5	--	UG/L	0.00	
Trichloroethylene	09/18/2019	1.2	0.5	--	UG/L	0.00	

Table 11-6
OU III Western South Boundary Effluent Data
'Hits Only' July through September 2019

Site ID : 095-126 (System Effluent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/03/2019	0	--	--	UG/L	0.00	
1,4-Dioxane	09/18/2019	4.33	0.2	--	UG/L	0.00	
524.2 TVOC	09/18/2019	0	--	--	UG/L	0.00	

Site ID : 095-270 (System Effluent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/17/2019	0	--	--	UG/L	0.00	
524.2 TVOC	07/18/2019	0	--	--	UG/L	0.00	
524.2 TVOC	08/20/2019	0.21	--	--	UG/L	0.00	
Methyl chloride	08/20/2019	0.21	0.5	--	UG/L	0.00	J
524.2 TVOC	09/04/2019	0	--		UG/L	0.00	

Qualifiers :

J = Estimated value.

D = Compound was identified in an analysis at a secondary dilution factor.

Organic Compounds :

B = Compound was found in both the sample And associated laboratory blank.

Inorganic Compounds :

B = Result Is between instrument detection limit And contract required reporting limit.

Section 12
Q3-2019 Operations Summary
OU III Strontium-90 Chemical Holes Treatment System

Process: Groundwater extraction and treatment via zeolite resin (Clinoptilolite) for the removal of Sr-90, with discharge to dry wells.

Goal: Reach Maximum Contaminant Levels (MCLs) in core monitoring wells within 40 years for the Upper Glacial aquifer (by 2040).

Start Date: February 2003

Table 12-1
OU III Sr-90 Chemical Holes
Pumping Rates (gpm)

Site Id #	106-92	106-123	106-124
Screen Interval (ft bls)	23.5-38.5	35-45	35-45
Desired Flow Rate (gpm)	0.0	0.0	0.0
July (Avg monthly gpm)	0.0	0.0	0.0
August	0.0	0.0	0.0
September	0.0	0.0	0.0
Actual (Avg. over Qtr. when on)	0.0	0.0	0.0

***** All three extraction wells began pulse pumping (one month on and two months off) in October 2014. In October 2015, EW-1 began full time operation. In April 2016, EW-1 was placed into pulsed pumping mode (one month on and one month off). In October 2016, EW-2 and EW-3 were placed in stand-by mode while EW-1 continued in pulsed pumping mode. EW-1 was placed in stand-by mode in July 2018.

Figure 12-1
Chemical Holes Strontium-90 Cumulative Millicuries Removed

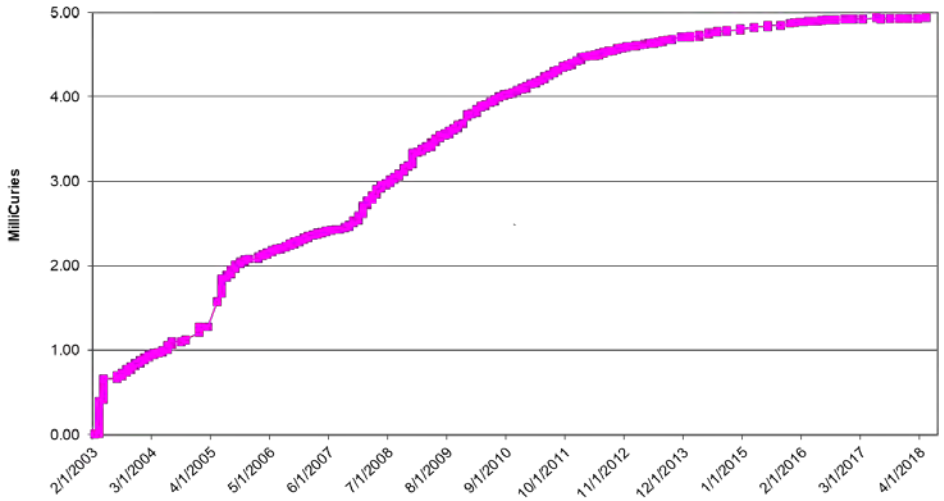


Figure 12-2
Chemical Holes Influent Strontium-90 Concentrations

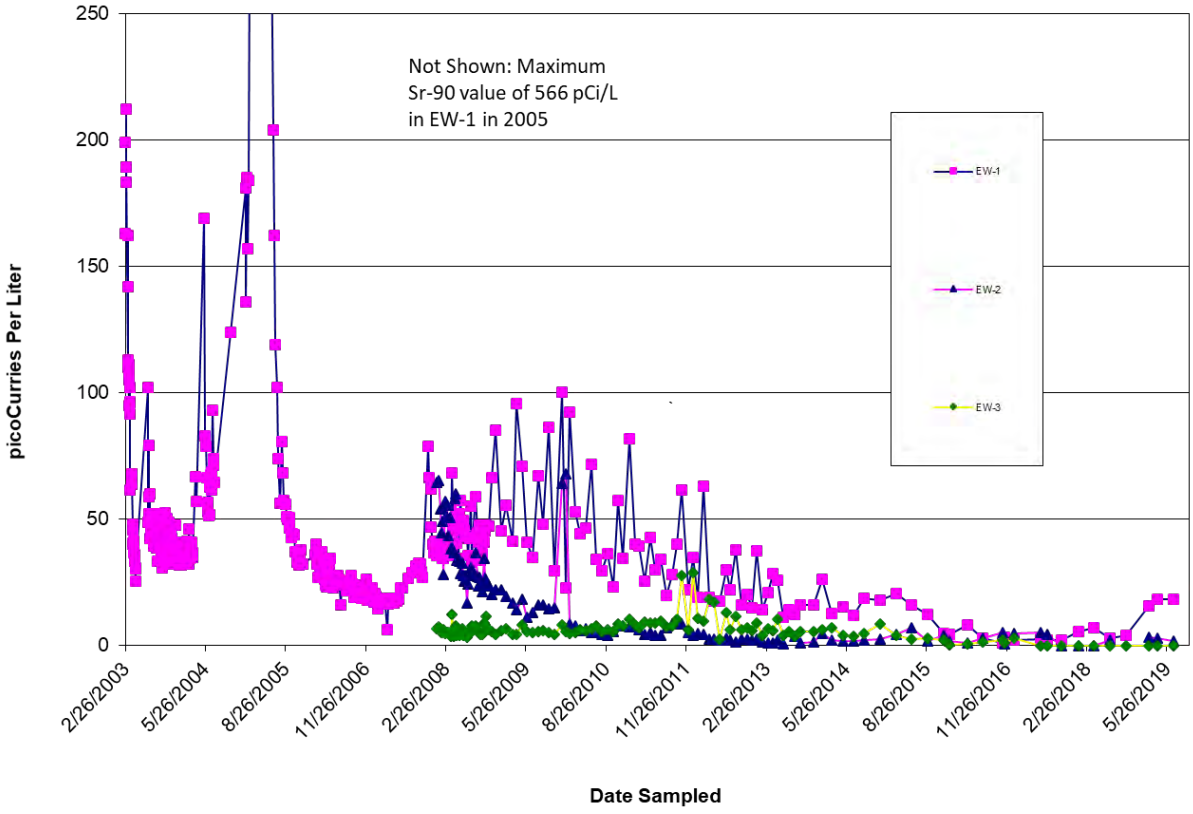


Table 12-2
OU III Sr-90 Chemical Holes Treatment System Effluent Water Quality
SPDES Equivalency Permit Concentrations July 1 – September 30, 2019

Parameter	Permit Limit	Max. Measured Value	Units	Frequency
Flow	**Monitor**	**NA**	**GPM**	**Continuous**
pH (range)	**5.0 - 8.5**	**NA**	**SU**	**Monthly**
Sr-90	**8**	**NA**	**pCi/L**	**Monthly**

NA = Not Applicable. The system was shut down in July 2018.
ND = Not Detected.

Systems Operations

July 2019:

The system was in stand-by mode.

August 2019:

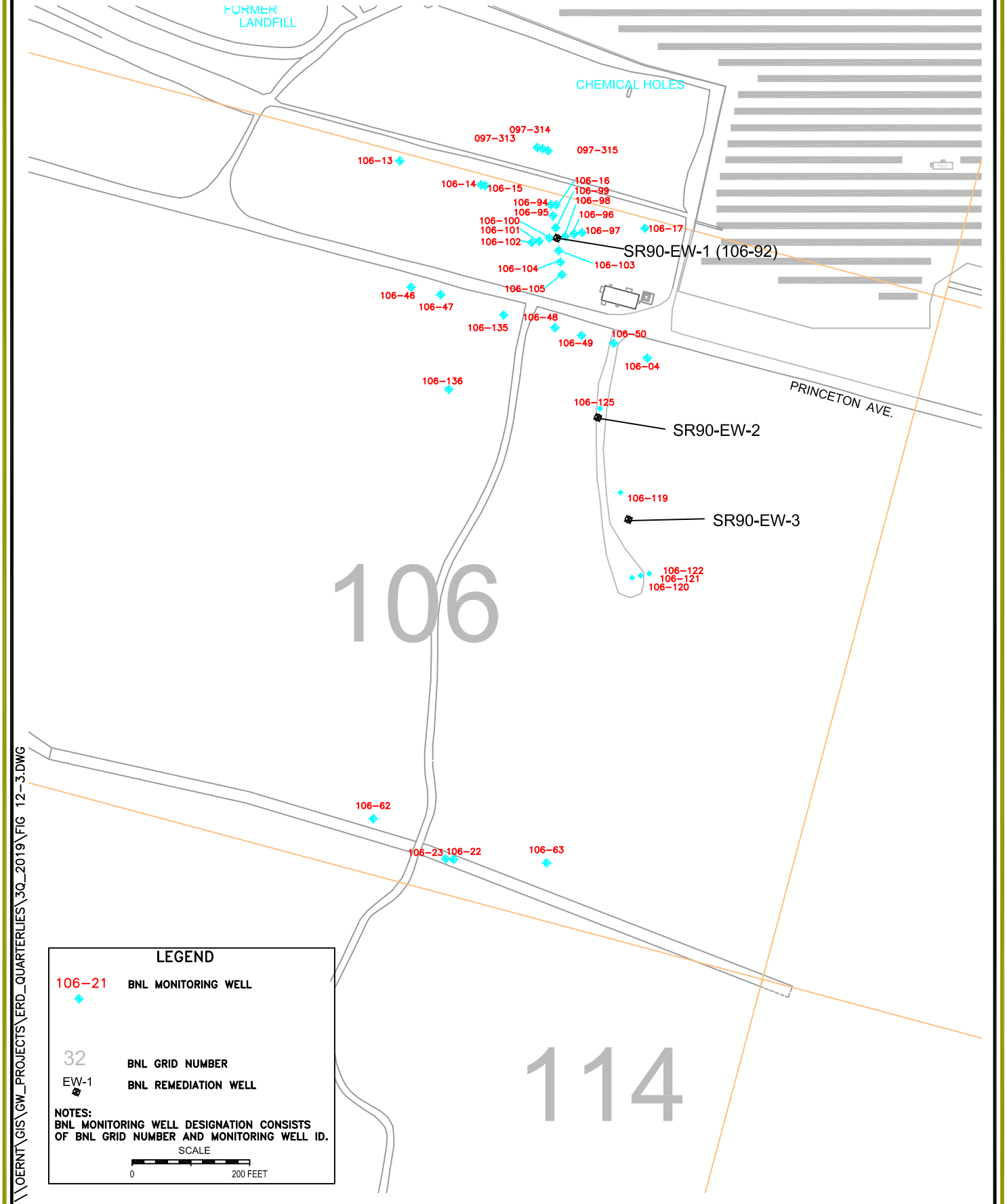
The system was in stand-by mode.

September 2019:

The system was in stand-by mode.

Planned Operational Changes

- Maintain the system in stand-by mode. If significant rebound is identified, these extraction wells may be restarted. During the third quarter, Sr-90 concentrations in the extraction wells remained low.



BROOKHAVEN NATIONAL LABORATORY
ENVIRONMENTAL PROTECTION DIVISION

TITLE:

CHEMICAL HOLES
Sr-90 MONITORING WELL NETWORK

SITEWIDE REMEDIATION SYSTEMS
THIRD QUARTER 2019 OPERATIONS REPORT

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
JEB	–	07/15/08	–
CHKD:	APPD:	REV.:	NOTES:
RH	– –	11/18/19	–

FIGURE NO.: 12-3

Table 12-3
OU III Strontium-90 Chemical Holes Monitoring Well Data
"Hits Only" - July through September 2019

Site ID : 097-313

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/15/2019	6.17	0.791	0.851	PCI/L	30.65	

Site ID : 097-314

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/15/2019	19.5	0.725	1.41	PCI/L	40.00	

Site ID : 097-315

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/15/2019	1.9	0.776	0.607	PCI/L	30.45	

Site ID : 106-100

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/15/2019	2.12	0.795	0.599	PCI/L	27.35	

Site ID : 106-103

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/09/2019	4.11	0.672	0.74	PCI/L	26.66	

Site ID : 106-119

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/11/2019	1.95	0.512	0.367	PCI/L	40.00	

Site ID : 106-122

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/11/2019	0.971	0.399	0.269	PCI/L	40.00	

Site ID : 106-125

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/11/2019	2.09	0.563	0.385	PCI/L	40.00	

Site ID : 106-136

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/11/2019	5.07	0.357	0.37	PCI/L	27.59	

Site ID : 106-16

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/12/2019	6.47	0.562	0.506	PCI/L	32.25	

Site ID : 106-94

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/12/2019	8.13	0.329	0.434	PCI/L	32.49	

Table 12-3
OU III Strontium-90 Chemical Holes Monitoring Well Data
"Hits Only" - July through September 2019

Site ID : 106-95

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/12/2019	10.3	0.477	0.608	PCI/L	32.19	

Site ID : 106-99

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/15/2019	10.9	0.757	0.958	PCI/L	28.70	

Table 12-4
OU III Strontium-90 Chemical Holes Extraction Well Data
"Hits Only" - July through September 2019

Site ID : 106-123 (EW-2)

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/02/2019	1.64	0.776	0.565	PCI/L	0.00	

Site ID : 106-92 (EW-1)

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/02/2019	18.2	0.771	1.5	PCI/L	0.00	

Section 13

Q3-2019 Operations Summary
OU III Former Industrial Park East Pump & Treat System
(System Closed)

The Petition for Closure for the OU III Industrial Park East Groundwater Treatment System was submitted to the regulators for review in May 2013. Approval was received from the regulators in June and July 2013 that the system met its treatment goals and can now be dismantled. Any remaining contaminants in the downgradient portion of the plume beyond the capture zone of the extraction wells will attenuate to below MCLs in the Upper Glacial and Magothy aquifers before the required 2030 and 2065 cleanup timeframes, respectively.

Dismantlement activities have been initiated including the abandonment of four groundwater monitoring wells (000-489, 000-493, 000-513, 000-514) and the two groundwater extraction wells (EWI-1 and EWI-2) in September 2013. Final decommissioning of the treatment system will be performed following the completion of remediation of the deep VOC contamination in the Industrial Park.

The building, carbon units, and the two recharge wells are being used with the two new extraction wells for remediation of the deep VOC contamination in the Industrial Park.

The post closure monitoring network consists of four wells. In accordance with the recommendation in the *2015 Groundwater Status Report*, VOC monitoring for seven wells was discontinued in the fourth quarter of 2016 since the wells have been below the AWQS for a minimum of four consecutive sampling events. The data from the four wells are also evaluated as part of the North Street and Magothy monitoring programs. Monitoring will continue until MCLs are achieved for a minimum of four consecutive sampling events. The monitoring schedule is described in the BNL Environmental Monitoring Plan (EMP).

Section 14

Q3-2019 Operations Summary
OU III North Street Pump & Treat System

Process: Groundwater extraction and liquid phase granular activated carbon treatment, with discharge to injection wells

Goal: Reach Maximum Contaminant Levels (MCLs) or asymptotic conditions in core monitoring wells within 30 years for the Upper Glacial aquifer and within 65 years for the Magothy aquifer (by 2030 and 2065, respectively).

Start Date: June 2004

Table 14-1
OU III North Street Pump & Treat System
Pumping Rates (gpm)

Extraction Well	NS-1	NS-2
Site ID #	000-471	000-473
Screen Interval (ft bls)	165-205	190-220
Design Flow Rate (GPM)	200	250
July	off	off
August	off	off
September	off	off
Actual (Avg. over Qtr.)	0	0

Notes: The system was shut down and placed in standby mode in 2013. NS-1 was temporarily restarted in 2014 due to increasing VOCs in nearby monitoring wells, and then shut down in June 2015. NS-1 was again restarted in August 2015. NS-2 was restarted September 2014 due to increasing VOCs in nearby monitoring wells, and then shut down in June 2015. The system was shut down and placed in standby mode August 2016.

Figure 14-1
OU III North Street Pump & Treat System
Cumulative Mass Removal of VOCs vs. Time

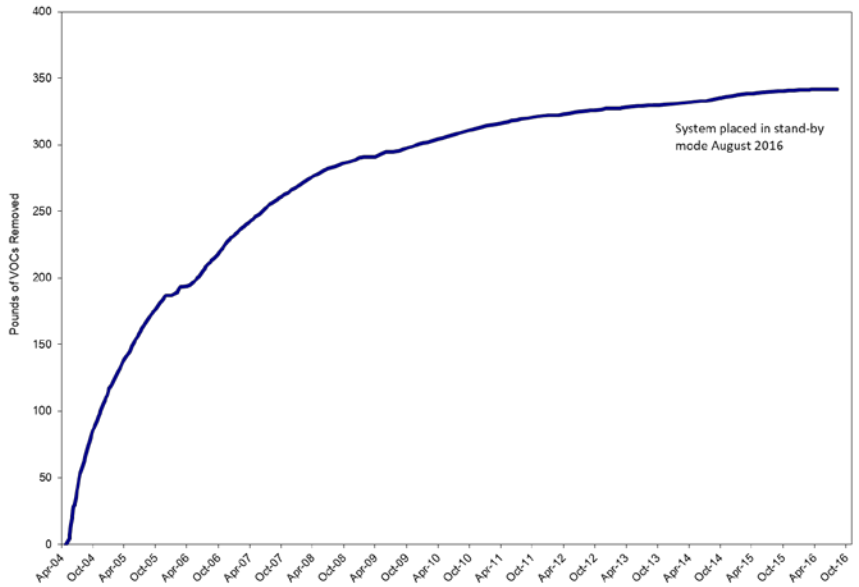


Figure 14-2
OU III North Street Pump & Treat System
Influent TVOC Concentrations vs. Time

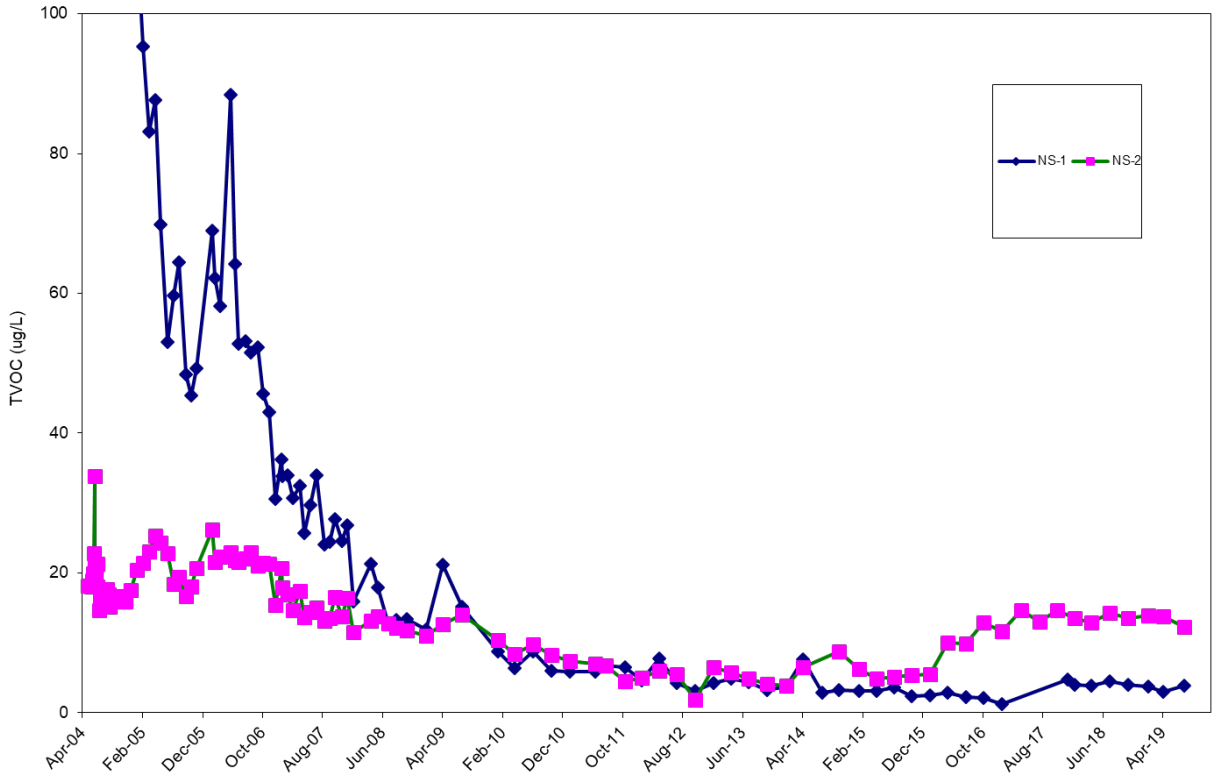


Table 14-2
Effluent Water Quality
SPDES Equivalency Permit Concentrations July 1 – Sept 30, 2019

Parameter	Permit Limit	Max. Measured Value	Units	Frequency
Flow	**Monitor**	NA [1]	**GPD**	**Continuous**
pH (range)	**5.5 - 8.5**	NA	**SU**	**Monthly**
Carbon Tetrachloride	**5**	NA	**ug/L**	**Monthly**
Chloroform	**5**	NA	**ug/L**	**Monthly**
1,1-Dichloroethane	**5**	NA	**ug/L**	**Monthly**
1,2-Dichloroethane	**5**	NA	**ug/L**	**Monthly**
1,1-Dichloroethylene	**5**	NA	**ug/L**	**Monthly**
Tetrachloroethylene	**5**	NA	**ug/L**	**Monthly**
Toluene	**5**	NA	**ug/L**	**Monthly**
1,1,1-Trichloroethane	**5**	NA	**ug/L**	**Monthly**
Trichloroethylene	**10**	NA	**ug/L**	**Monthly**

[1] The system is in stand-by mode. [NA=] Not Applicable.

System Operations

July 2019:

NS-1 and NS-2 remained in standby mode.

August 2019:

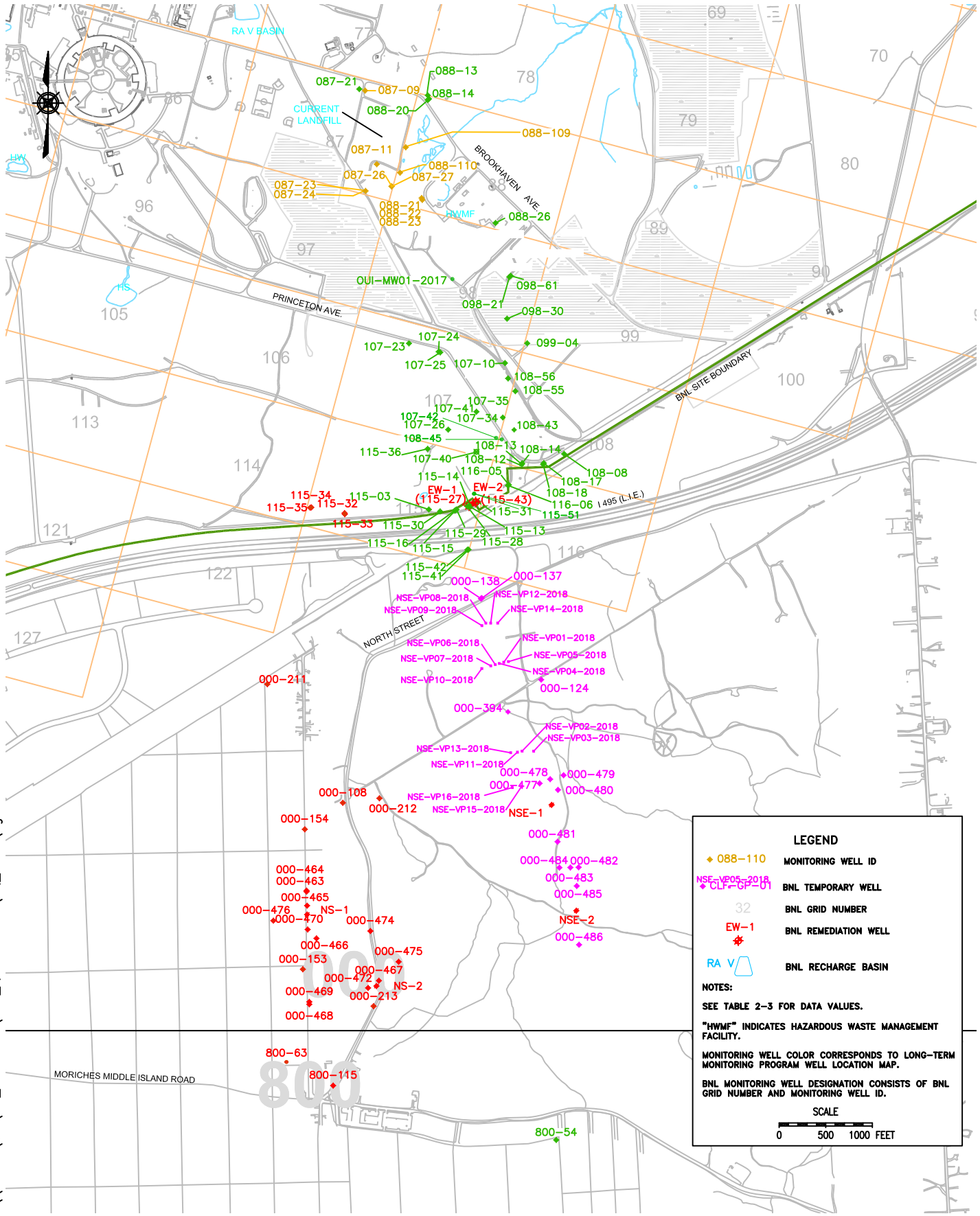
NS-1 and NS-2 remained in standby mode.

September 2019:

NS-1 and NS-2 remained in standby mode.

Planned Operational Changes

- NS-1 and NS-2 will remain in standby mode. Submit a Petition for Closure as this system has met its cleanup goal. During the third quarter of 2019, TVOC concentrations in extraction well NS-1 and NS-2 remained below 50 µg/L. The monitoring wells were not sampled in the third quarter.



LEGEND

- 088-110 — MONITORING WELL ID
- NSE-VP05-2018 / CLF-GP-01 — BNL TEMPORARY WELL
- 32 — BNL GRID NUMBER
- EW-1 — BNL REMEDIATION WELL
- RA V — BNL RECHARGE BASIN

NOTES:

SEE TABLE 2-3 FOR DATA VALUES.

"HWMF" INDICATES HAZARDOUS WASTE MANAGEMENT FACILITY.

MONITORING WELL COLOR CORRESPONDS TO LONG-TERM MONITORING PROGRAM WELL LOCATION MAP.

BNL MONITORING WELL DESIGNATION CONSISTS OF BNL GRID NUMBER AND MONITORING WELL ID.

SCALE

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BROOKHAVEN NATIONAL LABORATORY

ENVIRONMENTAL PROTECTION DIVISION

TITLE:

OU I SOUTH BOUNDARY/NORTH STREET/NORTH STREET EAST MONITORING WELL NETWORK

SITEWIDE REMEDIATION SYSTEMS
THIRD QUARTER 2019 OPERATIONS REPORT

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
JEB	–	08/08/11	–
CHKD:	APPD:	REV.:	NOTES:
RH	––	11/18/19	–

FIGURE NO.: 14-3

Table 14-4
OU III North Street Extraction Well Data
'Hits Only' July through September 2019

Site ID : 000-471 (NS-1)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/17/2019	0.28	0.5	--	UG/L	0.00	J
1,1,2,2-Tetrachloroethane	07/17/2019	0.17	0.5	--	UG/L	0.00	J
524.2 TVOC	07/17/2019	3.83	--	--	UG/L	0.00	
Carbon tetrachloride	07/17/2019	1.25	0.5	--	UG/L	0.00	
Chloroform	07/17/2019	0.85	0.5	--	UG/L	0.00	
Tetrachloroethylene	07/17/2019	0.21	0.5	--	UG/L	0.00	J
Trichloroethylene	07/17/2019	1.07	0.5	--	UG/L	0.00	

Site ID : 000-473 (NS-2)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/17/2019	3.34	0.5	--	UG/L	0.00	
1,1-Dichloroethylene	07/17/2019	1.48	0.5	--	UG/L	0.00	
524.2 TVOC	07/17/2019	12.29	--	--	UG/L	0.00	
Carbon tetrachloride	07/17/2019	0.55	0.5	--	UG/L	0.00	
Chloroform	07/17/2019	2.27	0.5	--	UG/L	0.00	
Tetrachloroethylene	07/17/2019	4.44	0.5	--	UG/L	0.00	
Trichloroethylene	07/17/2019	0.21	0.5	--	UG/L	0.00	J

Qualifiers :

J = Estimated value.
D = Compound was identified in an analysis at a secondary dilution factor.

Organic Compounds :

B = Compound was found in both the sample And associated laboratory blank.

Inorganic Compounds :

B = Result Is between instrument detection limit And contract required reporting limit.

Section 15

Q3-2019 Operations Summary
OU III North Street East Pump & Treat System

Process: Groundwater extraction and liquid phase granular activated carbon treatment, with discharge to injection wells.

Goal: Reach Maximum Contaminant Levels (MCLs) in core monitoring wells within 30 years for the Upper Glacial aquifer (by 2030).

Start Date: June 2004

Table 15-1
OU III North Street East Pump & Treat System
Pumping Rates (gpm)

Extraction Well	NSE-1	NSE-2
Site ID #	000-487	00-488
Screen Interval (ft bls)	161-191	152-182
Desired Flow Rate (GPM)	200	100
July	0	0
August	0	0
September	0	0
Actual (Avg. over Qtr.)	0	0

Notes: The system was shut down June 2014 following approval from the regulators on the Petition for Shutdown.

Figure 15-1
OU III North Street East Pump & Treat System
Cumulative Mass Removal of VOCs vs. Time

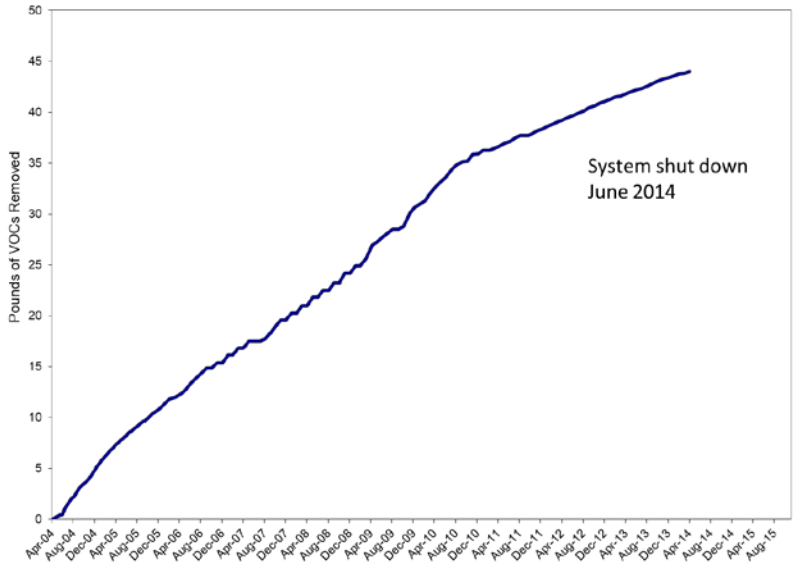


Figure 15-2
OU III North Street East Pump & Treat System
Influent TVOC Concentrations vs. Time

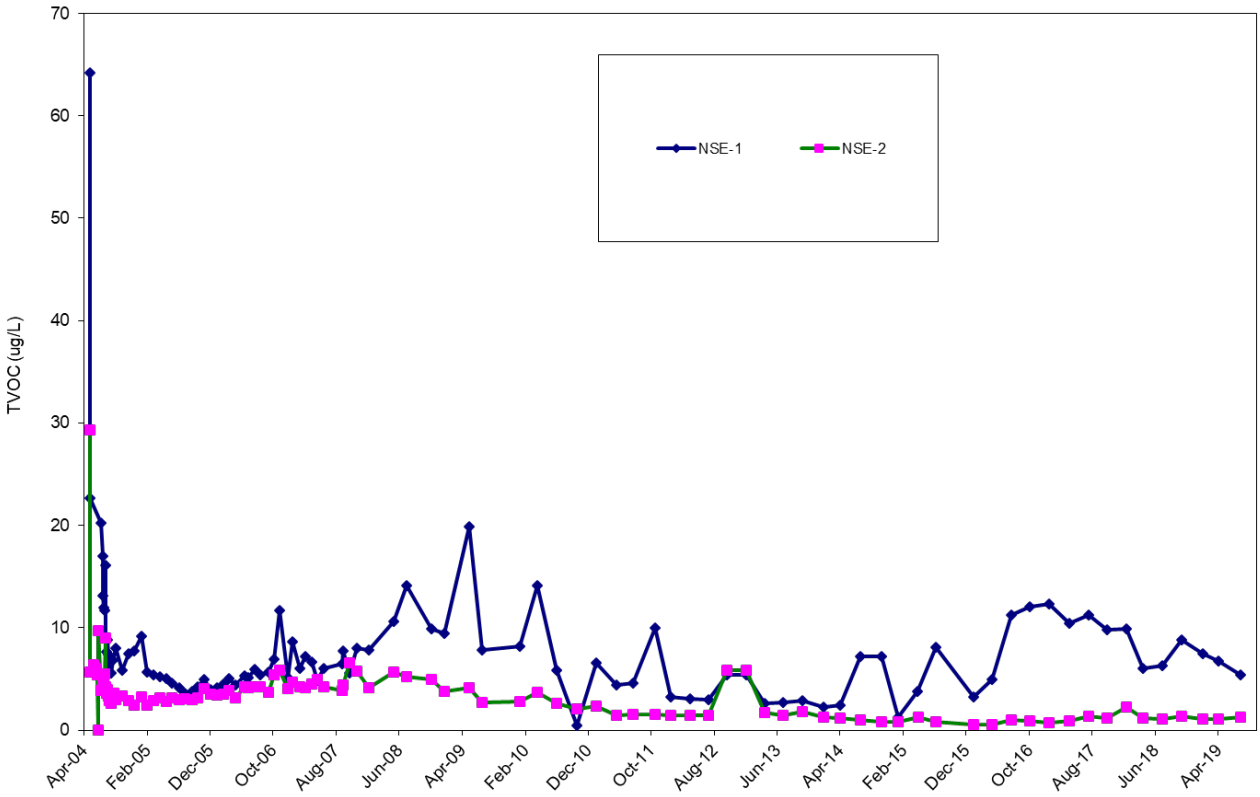


Table 15-2
Effluent Water Quality
SPDES Equivalency Permit Concentrations July 1 – September 30, 2019

Parameter	Permit Limit	Max. Measured Value	Units	Frequency
Flow	**Monitor**	**NA**	**GPD**	**Continuous**
pH (range)	**5.5 - 8.5**	**NA**	**SU**	**Monthly**
Carbon Tetrachloride	**5**	**NA**	**ug/L**	**Monthly**
Chloroform	**5**	**NA**	**ug/L**	**Monthly**
1,1-Dichloroethane	**5**	**NA**	**ug/L**	**Monthly**
1,2-Dichloroethane	**5**	**NA**	**ug/L**	**Monthly**
1,1-Dichloroethylene	**5**	**NA**	**ug/L**	**Monthly**
Tetrachloroethylene	**5**	**NA**	**ug/L**	**Monthly**
Toluene	**5**	**NA**	**ug/L**	**Monthly**
1,1,1-Trichloroethane	**5**	**NA**	**ug/L**	**Monthly**
Trichloroethylene	**10**	**NA**	**ug/L**	**Monthly**

NA= Not Applicable. The system is in stand-by mode.

System Operations

July 2019:

The system remained in standby mode.

August 2019:

The system remained in standby mode.

September 2019:

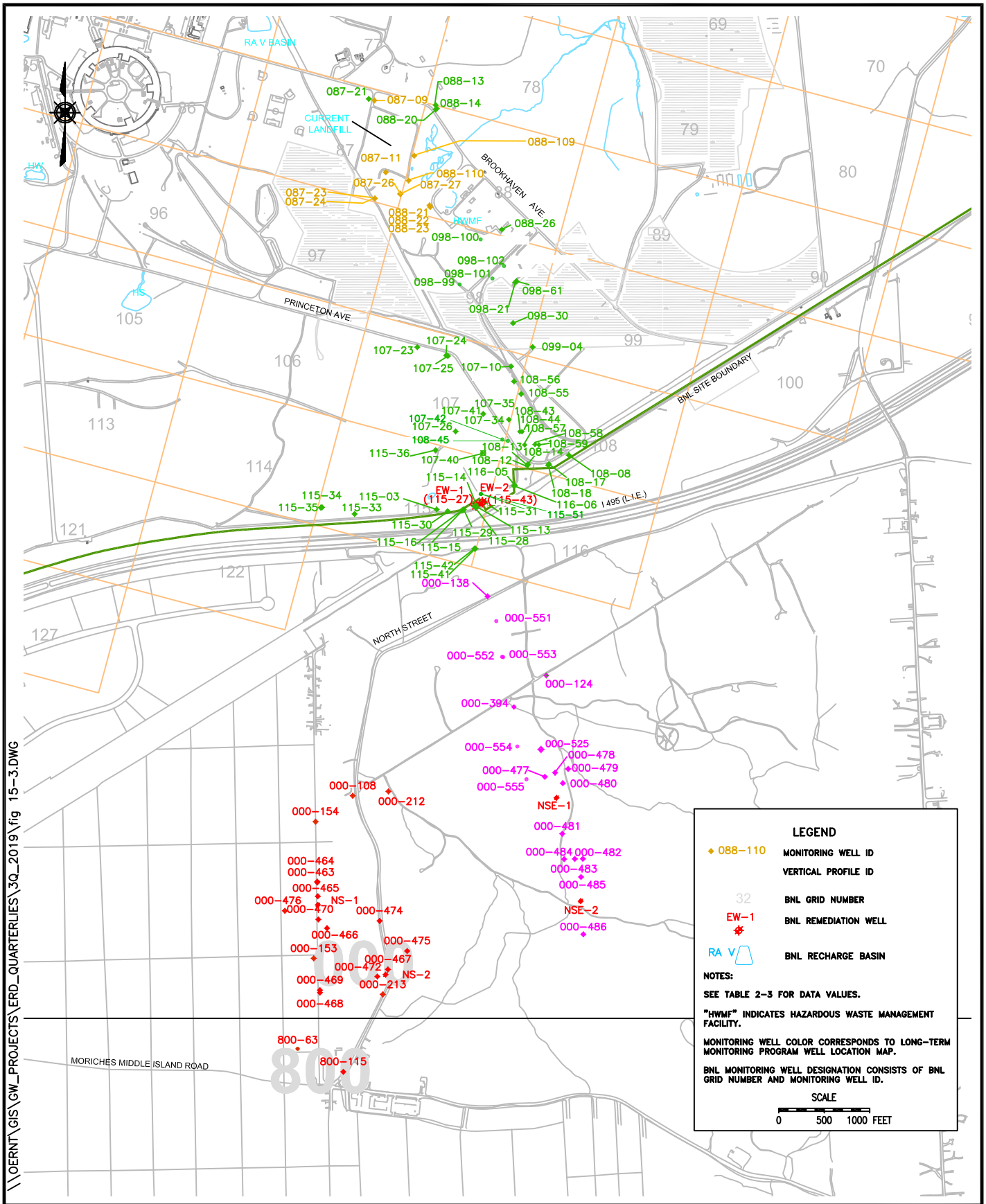
The system remained in standby mode.

The Modification to the North Street East Groundwater Treatment System was submitted to the regulators September 3, 2019. This includes two additional extraction wells to

remediate the ethylene dibromide (EDB) plume. The two additional extraction wells were installed and developed as well as four additional monitoring wells.

Planned Operational Changes

- Maintain the treatment system in standby mode. The extraction wells will continue to be sampled on a quarterly basis. One or both extraction wells can be restarted if TVOC concentrations in the core monitoring wells or extraction wells rebound above the capture goal of 50 µg/L, or if EDB is detected in NSE-1. During the third quarter, TVOC concentrations in the monitoring and extraction wells were less than 10 µg/L. The maximum EDB concentration detected in the third quarter was in monitoring well 000-394 at 0.178 µg/L. EDB was not detected in NSE-1 in the third quarter. Continue quarterly sampling of NSE-1 for EDB and analyze using Method 504.
- Continue modification of the treatment system to address the EDB plume.



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BROOKHAVEN NATIONAL LABORATORY

ENVIRONMENTAL PROTECTION DIVISION

TITLE:

OU I SOUTH BOUNDARY/NORTH STREET/NORTH STREET EAST MONITORING WELL NETWORK

SITEWIDE REMEDIATION SYSTEMS
THIRD QUARTER 2019 OPERATIONS REPORT

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
JEB	–	08/08/11	NA
CHKD:	APPD:	REV.:	NOTES:
RH	--	11/18/19	–

FIGURE NO.: 15-3

Table 15-3
OU III North Street East Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 000-394

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
EDB	08/14/2019	0.178	0.0197	--	UG/L	178.00	

Site ID : 000-551

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
EDB	08/14/2019	0.0201	0.0199	--	UG/L	175.00	

Site ID : 000-552

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
EDB	08/14/2019	0.095	0.0198	--	UG/L	155.00	

Table 15-4
OU III North Street East Extraction Well Data
'Hits Only' July through September 2019

Site ID : 000-487 (NSE-1)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/17/2019	1.14	0.5	--	UG/L	0.00	
1,1-Dichloroethylene	07/17/2019	0.84	0.5	--	UG/L	0.00	
524.2 TVOC	07/17/2019	5.41	--	--	UG/L	0.00	
Chloroform	07/17/2019	1.81	0.5	--	UG/L	0.00	
Tetrachloroethylene	07/17/2019	0.45	0.5	--	UG/L	0.00	J
Trichloroethylene	07/17/2019	1.17	0.5	--	UG/L	0.00	

Site ID : 000-488 (NSE-2)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/17/2019	1.27	--	--	UG/L	0.00	
Chloroform	07/17/2019	1.27	0.5	--	UG/L	0.00	

Qualifiers :

J = Estimated value.
D = Compound was identified in an analysis at a secondary dilution factor.

Organic Compounds :

B = Compound was found in both the sample And associated laboratory blank.

Inorganic Compounds :

B = Result Is between instrument detection limit And contract required reporting limit.

Section 16

Q3-2019 Operations Summary
OU III LIPA/Airport Treatment System

Process: Groundwater extraction and liquid phase granular activated carbon treatment, with discharge to injection wells

Goal: Reach Maximum Contaminant Levels (MCLs) in core monitoring wells within 30 years for the Upper Glacial aquifer (by 2030), and within 65 years for the Magothy aquifer (by 2065).

Start Date: August 2004

Table 16-1
OU III LIPA/Airport Treatment System
Pumping Rates (gpm)

Extraction Well	EW-1L	EW-2L	EW-3L	EW-4L*	RTW-1A	RTW-2A	RTW-3A	RTW-4A*	RTW-5A	RTW-6A
Site ID	000-453	000-455	000-457	000-461	800-109	800-110	800-111	800-112	800-113	800-132
Screen Interval (ft bls)	217-237	224-244	216-236	304-324	188-208	188-208	210-230	268-288	220-240	165-185
Desired Flow Rate (GPM)	0**	0**	0**	0**	100	100	100	100	0***	150
July	0	0	0	0	96	0	0	149	0	145
August	0	0	0	0	90	60	115	142	0	140
Sept	0	0	0	0	100	60	141	114	0	153
Actual (Avg. over QTR.)	**0**	**0**	**0**	**0**	**95**	**60**	**128**	**135**	**0**	**146**

***** EW-4L and RTW-4A are Magothy aquifer extraction wells.

****** EW-1L, EW-2L, and EW-3L are in standby mode. EW-4L was put in standby January 2017. RTW-2A and RTW-3A are pulse pumping, consisting of one week on and three weeks off. RTW-4A resumed full time operation in 2011.

***RTW-5A was placed on standby September 2016.

Figure 16-1
OU III LIPA/ Airport Treatment System
Cumulative Mass Removal of VOCs vs. Time

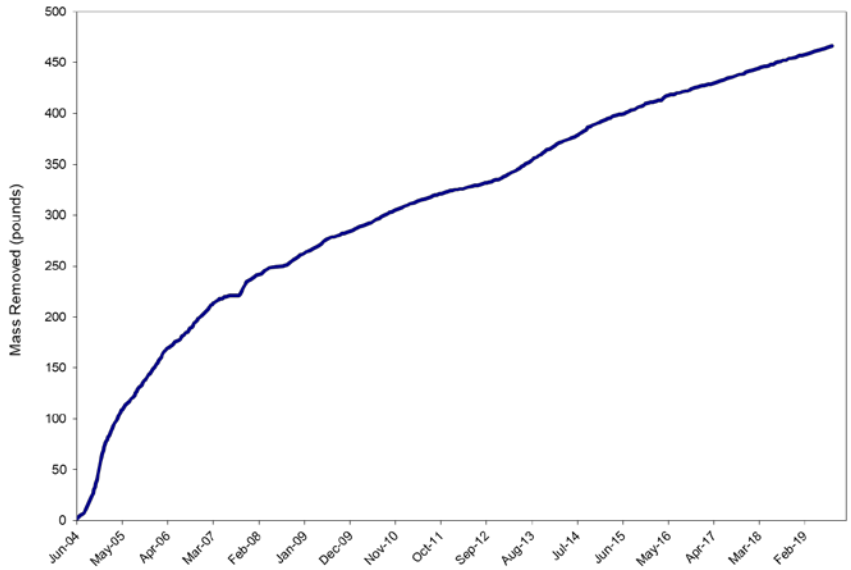


Figure 16-2
OU III LIPA/ Airport Treatment System
Influent TVOC Concentrations vs. Time

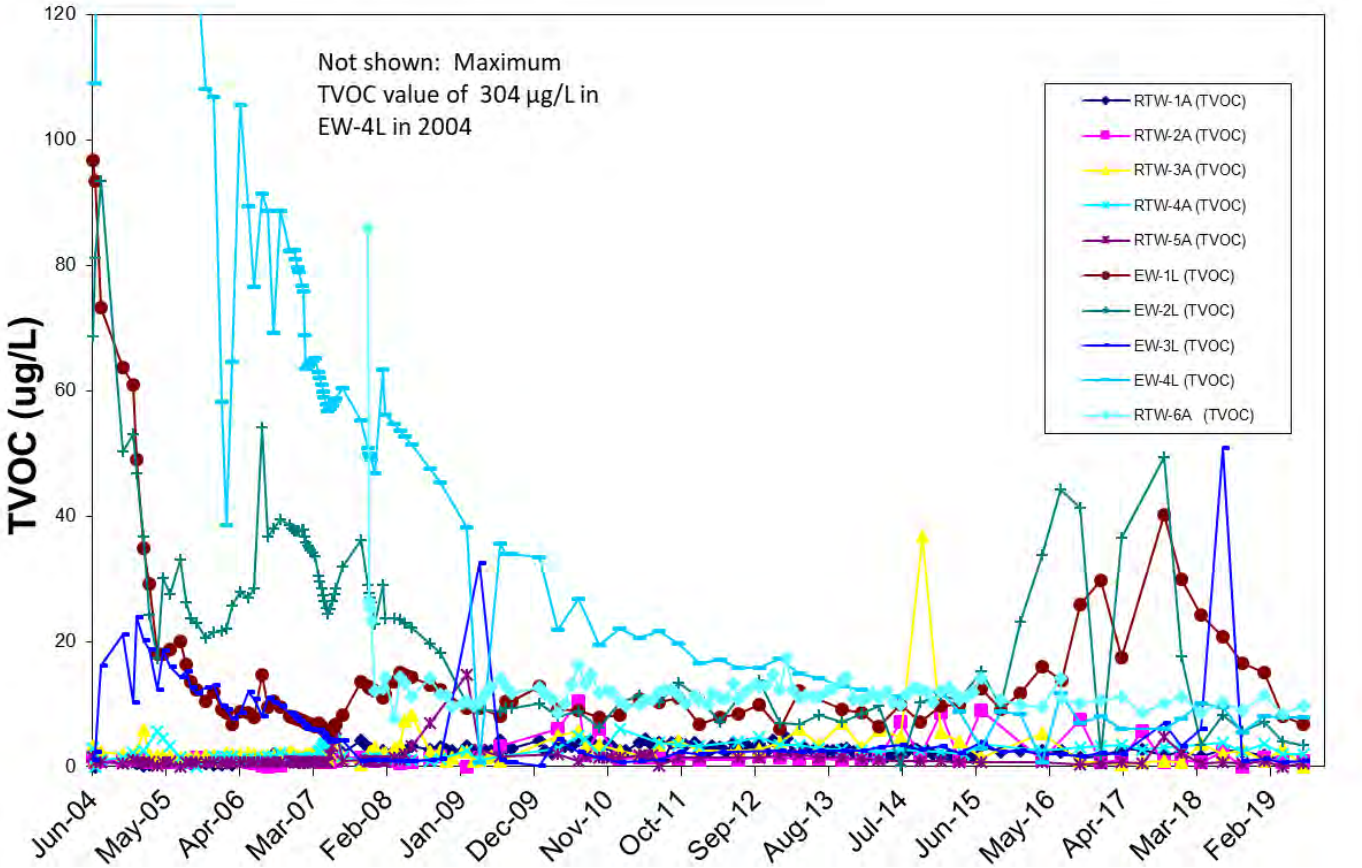


Table 16-2
Effluent Water Quality
SPDES Equivalency Permit Concentrations July 1 – September 30, 2019

Parameter	Permit Limit	Max. Measured Value	Units	Frequency
Flow	Monitor	578,352 [1]	GPD	Continuous
pH (range)	5.5 – 7.5	5.8-6.0	SU	Monthly
Carbon Tetrachloride	5	<0.50	ug/L	Monthly
Chloroform	7	0.8	ug/L	Monthly
1,1-Dichloroethane	5	<0.50	ug/L	Monthly
1,1-Dichloroethylene	5	<0.50	ug/L	Monthly
Methylene Chloride	5	<0.50	ug/L	Monthly
1,1,1-Trichloroethane	5	<0.50	ug/L	Monthly
Trichloroethylene	10	<0.50	ug/L	Monthly

[1] The average flow for the operational period at the influent flow meter.

System Operations

July 2019:

Extraction wells RTW-1A, RWT-4A, and RTW-6A ran normally for the month. RTW-2A, and RTW-3A were not pulsed pumped due to maintenance. The LIPA extraction wells and Airport extraction well RTW-5A remained in standby mode. The system was down for three days for a scheduled carbon change-out. The system treated approximately 17 million gallons of water.

August 2019:

Extraction wells RTW-1A, RTW-4A and RTW-6A ran normally for the month. RTW-2A, and RTW-3 were pulsed pumped for approximately one week. The LIPA system and Airport extraction well RTW-5A remained in standby mode. The system treated approximately 18 million gallons of water.

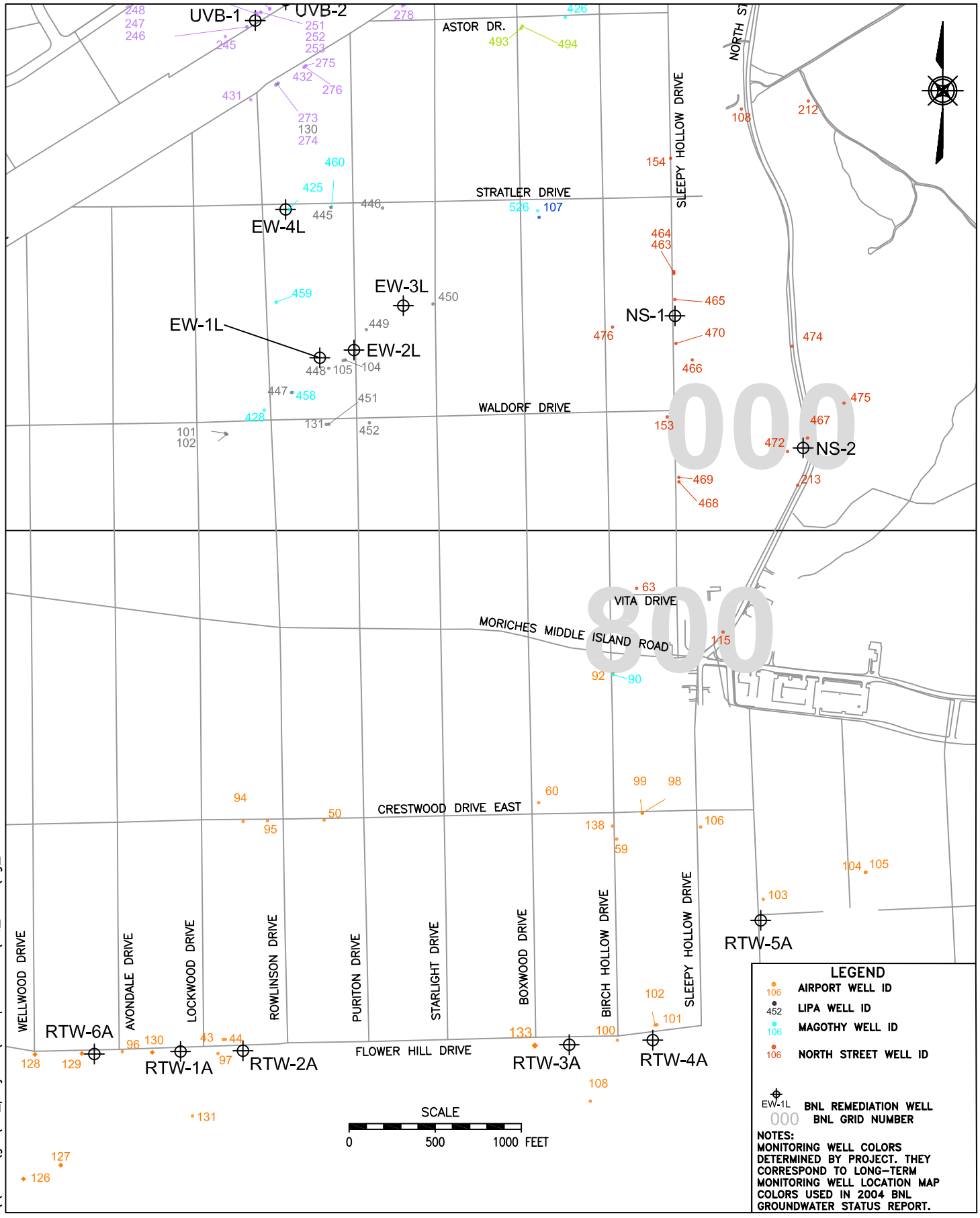
September 2019:

Extraction wells RTW-1A, RTW-4A and RTW-6A ran normally for the month. Wells RTW-2A and RTW-3A were pulsed pumped for approximately one week. The LIPA system and Airport extraction well RTW-5A remained in standby mode. The system treated approximately 18 million gallons of water.

The system treated approximately 53 million gallons of water during the third quarter of 2019.

Planned Operational Changes

- Continue the Airport extraction wells pulsed pumping schedule of pumping one week per month for wells RTW-2A and RTW-3A and continue full time operation of wells RTW-1A, RTW-4A and RTW-6A. Maintain well RTW-5A in standby mode. If concentrations above the capture goal of 10 µg/L TVOC are observed in any of the extraction wells or the monitoring wells adjacent to wells that are not operating, the well(s) will be put back into full-time operation. During the third quarter of 2019, extraction wells RTW-2A, RTW-3A, RTW-5A, and adjacent monitoring wells did not exceed TVOC concentrations of 10 µg/L.
- Maintain LIPA wells EW-1, EW-2, EW-3L and EW-4L in standby mode. These extraction wells may be restarted if TVOC concentrations rebound above the 50 µg/L capture goal in either the plume core monitoring wells or the extraction wells. During the third quarter of 2019, none of the LIPA monitoring wells detected TVOCs above the capture goal of 50 µg/L.



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BROOKHAVEN NATIONAL LABORATORY

ENVIRONMENTAL PROTECTION DIVISION

TITLE:

OU III AIRPORT/LIPA

SITEWIDE REMEDIATION SYSTEMS
THIRD QUARTER 2019 OPERATIONS REPORT

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
JEB	–	09/26/05	–
CHKD:	APPD:	REV.:	NOTES:
BH	––	11/18/19	–

FIGURE NO.: 16-3

Table 16-3
OU III LIPA/Airport Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 000-428

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/20/2019	0	--	--	UG/L	298.00	

Site ID : 800-108

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/28/2019	0.3	--	--	UG/L	216.00	
Chloroform	08/28/2019	0.3	0.5	--	UG/L	216.00	J

Site ID : 800-126

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/29/2019	0.37	--	--	UG/L	175.00	
Carbon tetrachloride	08/29/2019	0.37	0.5	--	UG/L	175.00	J

Site ID : 800-127

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/29/2019	0	--	--	UG/L	175.00	

Site ID : 800-128

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/28/2019	0	--	--	UG/L	180.00	

Site ID : 800-131

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/29/2019	0.75	--	--	UG/L	194.00	
Carbon tetrachloride	08/29/2019	0.47	0.5	--	UG/L	194.00	J
Chloroform	08/29/2019	0.28	0.5	--	UG/L	194.00	J

Site ID : 800-133

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	08/28/2019	1.31	--	--	UG/L	225.00	
Chloroform	08/28/2019	0.98	0.5	--	UG/L	225.00	
Methyl tert-butyl ether	08/28/2019	0.33	0.5	--	UG/L	225.00	J

Site ID : 800-60

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	08/29/2019	0.23	0.5	--	UG/L	210.00	J
524.2 TVOC	08/29/2019	0.78	--	--	UG/L	210.00	
Chloroform	08/29/2019	0.55	0.5	--	UG/L	210.00	

Table 16-4
OU III LIPA/Airport Extraction Well Data
'Hits Only' July through September 2019

Site ID : 000-453 (EW-1L)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/10/2019	2.2	0.5	--	UG/L	227.00	
1,1-Dichloroethylene	07/10/2019	1.4	0.5	--	UG/L	227.00	
524.2 TVOC	07/10/2019	6.7	--	--	UG/L	227.00	
Chloroform	07/10/2019	1.9	0.5	--	UG/L	227.00	
Trichloroethylene	07/10/2019	1.2	0.5	--	UG/L	227.00	

Site ID : 000-455 (EW-2L)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/10/2019	0.93	0.5	--	UG/L	234.00	
1,1-Dichloroethylene	07/10/2019	0.61	0.5	--	UG/L	234.00	
524.2 TVOC	07/10/2019	3.45	--	--	UG/L	234.00	
Chloroform	07/10/2019	0.92	0.5	--	UG/L	234.00	
Trichloroethylene	07/10/2019	0.99	0.5	--	UG/L	234.00	

Site ID : 000-457 (EW-3L)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/10/2019	0.86	--	--	UG/L	226.00	
Chloroform	07/10/2019	0.86	0.5	--	UG/L	226.00	

Site ID : 000-461 (EW-4L)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/10/2019	7.8	--	--	UG/L	314.00	
Carbon tetrachloride	07/10/2019	1.5	0.5	--	UG/L	314.00	
Chloroform	07/10/2019	1	0.5	--	UG/L	314.00	
Tetrachloroethylene	07/10/2019	3.7	0.5	--	UG/L	314.00	
Trichloroethylene	07/10/2019	1.6	0.5	--	UG/L	314.00	

Site ID : 800-109 (RTW-1A)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/10/2019	1.54	--	--	UG/L	198.00	
Carbon tetrachloride	07/10/2019	0.85	0.5	--	UG/L	198.00	
Chloroform	07/10/2019	0.69	0.5	--	UG/L	198.00	

Site ID : 800-110 (RTW-2A)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/10/2019	0.86	--	--	UG/L	198.00	
Chloroform	07/10/2019	0.86	0.5	--	UG/L	198.00	

Site ID : 800-111 (RTW-3A)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/10/2019	0	--	--	UG/L	220.00	

Table 16-4
OU III LIPA/Airport Extraction Well Data
'Hits Only' July through September 2019

Site ID : 800-112 (RTW-4A)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/10/2019	2.1	--	--	UG/L	278.00	
Chloroform	07/10/2019	1	0.5	--	UG/L	278.00	
Trichloroethylene	07/10/2019	1.1	0.5	--	UG/L	278.00	

Site ID : 800-113 (RTW-5A)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/10/2019	0.5	--	--	UG/L	230.00	
Chloroform	07/10/2019	0.5	0.5	--	UG/L	230.00	

Site ID : 800-132 (RTW-6A)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1-Dichloroethylene	07/10/2019	0.53	0.5	--	UG/L	175.00	
524.2 TVOC	07/10/2019	9.65	--	--	UG/L	175.00	
Carbon tetrachloride	07/10/2019	2.8	0.5	--	UG/L	175.00	
Chloroform	07/10/2019	0.72	0.5	--	UG/L	175.00	
Trichloroethylene	07/10/2019	5.6	0.5	--	UG/L	175.00	

Table 16-5
OU III LIPA/Airport Influent Data
'Hits Only' July through September 2019

Site ID : 800-122 (Combined Influent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/10/2019	5.06	--	--	UG/L	0.00	
Carbon tetrachloride	07/10/2019	1.5	0.5	--	UG/L	0.00	
Chloroform	07/10/2019	0.86	0.5	--	UG/L	0.00	
Trichloroethylene	07/10/2019	2.7	0.5	--	UG/L	0.00	
1,1,1-Trichloroethane	07/25/2019	0.2	0.5	--	UG/L	0.00	J
1,1-Dichloroethylene	07/25/2019	0.23	0.5	--	UG/L	0.00	J
524.2 TVOC	07/25/2019	5.08	--	--	UG/L	0.00	
Carbon tetrachloride	07/25/2019	1.4	0.5	--	UG/L	0.00	
Chloroform	07/25/2019	0.75	0.5	--	UG/L	0.00	
Trichloroethylene	07/25/2019	2.5	0.5	--	UG/L	0.00	
1,1,1-Trichloroethane	08/06/2019	0.3	0.5	--	UG/L	0.00	J
1,1-Dichloroethylene	08/06/2019	0.33	0.5	--	UG/L	0.00	J
524.2 TVOC	08/06/2019	4.28	--	--	UG/L	0.00	
Carbon tetrachloride	08/06/2019	0.91	0.5	--	UG/L	0.00	
Chloroform	08/06/2019	0.74	0.5	--	UG/L	0.00	
Trichloroethylene	08/06/2019	2	0.5	--	UG/L	0.00	
1,1,1-Trichloroethane	08/20/2019	0.24	0.5	--	UG/L	0.00	J
1,1-Dichloroethylene	08/20/2019	0.23	0.5	--	UG/L	0.00	J
524.2 TVOC	08/20/2019	5.96	--	--	UG/L	0.00	
Carbon tetrachloride	08/20/2019	2	0.5	--	UG/L	0.00	
Chloroform	08/20/2019	0.79	0.5	--	UG/L	0.00	
Trichloroethylene	08/20/2019	2.7	0.5	--	UG/L	0.00	
1,1,1-Trichloroethane	09/17/2019	0.2	0.5	--	UG/L	0.00	J
1,1-Dichloroethylene	09/17/2019	0.27	0.5	--	UG/L	0.00	J
524.2 TVOC	09/17/2019	5.11	--	--	UG/L	0.00	
Carbon tetrachloride	09/17/2019	1.3	0.5	--	UG/L	0.00	
Chloroform	09/17/2019	0.74	0.5	--	UG/L	0.00	
Trichloroethylene	09/17/2019	2.6	0.5	--	UG/L	0.00	

Table 16-6
OU III LIPA/Airport Effluent Data
'Hits Only' July through September 2019

Site ID : 800-124 (System Effluent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/10/2019	0.76	--	--	UG/L	0.00	
Chloroform	07/10/2019	0.76	0.5	--	UG/L	0.00	
524.2 TVOC	07/25/2019	0	--	--	UG/L	0.00	
524.2 TVOC	08/06/2019	0	--	--	UG/L	0.00	
524.2 TVOC	08/20/2019	0	--	--	UG/L	0.00	
524.2 TVOC	09/17/2019	0	--	--	UG/L	0.00	

Qualifiers :

J = Estimated value.

D = Compound was identified in an analysis at a secondary dilution factor.

Organic Compounds :

B = Compound was found in both the sample And associated laboratory blank.

Inorganic Compounds :

B = Result Is between instrument detection limit And contract required reporting limit.

Section 17

Q3-2019 Operations Summary
OU III Strontium-90 BGRR/WCF Treatment System

Process: Groundwater extraction with liquid phase granular activated carbon treatment for volatile organic compounds, followed by clinoptilolite zeolite treatment for the removal of Sr-90, with discharge to dry wells.

Goal: Reach Maximum Contaminant Levels (MCLs) in core monitoring wells within 70 years for the Upper Glacial aquifer (by 2070).

Start Date: June 2005

Table 17-1
OU III Strontium-90 BGRR/WCF Treatment System
Pumping Rates (gpm)

Extraction Well	SR-1	SR-2	SR-3	SR-4*	SR-5*	SR-6*	SR-7	SR-8	SR-9
Site Id #	065-368	065-369	075-676	075-677	075-678	065-403	075-702	075-703	075-704
Screen Interval (ft bls)	33-53	33.5-53.5	51-71	35-75	35-75	85-105	82-102	77-97	67-87
Desired Flow Rate (gpm)	**5**	**5**	**5**	**5**	**5**	**10**	**10**	**10**	**10**
July (Avg gpm)	5.4	6.0	7.0	0	0	0	0	3.2	10
August "	5.4	6.1	6.3	0	0	0	0	0	10
September "	3.1	2.9	3.1	0	0	0	0	1.3	5.7
Actual (Avg. over Qtr.)	**4.6**	**5.0**	**5.5**	**0**	**0**	**0**	**0**	**1.5**	**8.6**

*Wells SR-4 and SR-5 were placed in stand-by mode in September 2016. Well SR-6 was placed in standby mode in October 2017. Wells SR-3 and SR-7 were placed in standby mode October 2018. Well SR-8 was placed in pulsed pumping mode in October 2018. Well SR-3 was put back in operation in February 2019.

Figure 17-1
Strontium-90 BGRR/WCF Treatment System
Cumulative Millicuries Removed

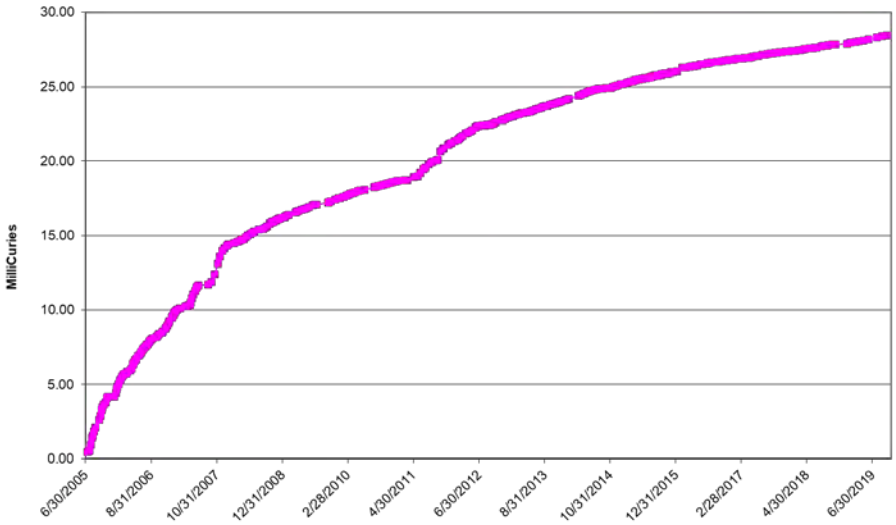

Figure 17-2
Strontium-90 BGRR/WCF Treatment System
Influent Sr-90 Concentrations vs. Time

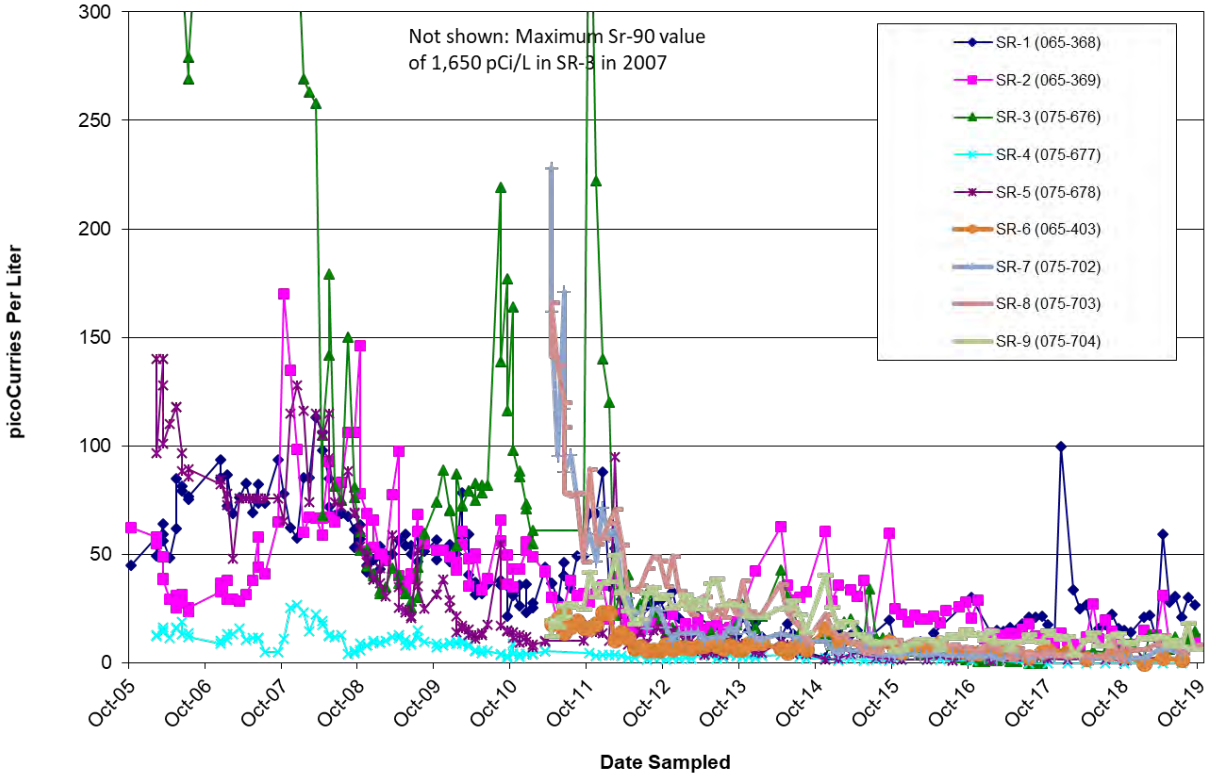

Table 17-2
Strontium-90 BGRR/WCF Treatment System Effluent Water Quality
SPDES Equivalency Permit Concentrations July 1, 2019 – September 30, 2019

Parameter	Permit Limit	Max. Measured Value	Units	Frequency
Flow	75	32	GPM	Continuous
pH (range)	5.5 – 8.5	6.2– 6.9	SU	Weekly
Strontium-90	8.0	2.4	PCi/L	Monthly[1]
Chloroform	7.0	<0.5	ug/L	Monthly[1]
1,1-Dichloroethane	5.0	<0.5	ug/L	Monthly[1]
Ethylbenzene	5.0	<0.5	ug/L	Monthly[1]
Methyl Chloride	5.0	<0.5	ug/L	Monthly[1]
Methylene Chloride	5.0	<0.5	ug/L	Monthly[1]
Toluene	5.0	<0.5	ug/L	Monthly[1]
1,2,3-Trichlorobenzene	5.0	<0.5	ug/L	Monthly[1]
1,1,1-Trichloroethane	5.0	<0.5	ug/L	Monthly[1]
1,2,4-Trimethylbenzene	5.0	<0.5	ug/L	Monthly[1]
Xylene, total	10.0	<0.5	ug/L	Monthly[1]

[1] The minimum measurement frequency shall be monthly following a period of 24 consecutive weekly sampling events showing no exceedances of the stated discharge limitations.
[2] Not detected.

System Operations

July 2019:

Wells SR-4 through SR-7 were in stand-by mode. Well SR-8 was off from July 11th to July 18th for repairs. The system treated approximately 1.4 million gallons of water.

August 2019:

The system operated normally for the month. Wells SR-4 through SR-7 were in stand-by mode. Well SR-8 was off for pulsed pumping. The system treated approximately 1.2 million gallons of water.

September 2019:

The system was off from September 12th to October 1st for a resin vessel change-out. Wells SR-4 through SR-7 were off in stand-by mode. The system treated approximately 0.7 million gallons of water.

The system treated approximately 3.3 million gallons of water during the third quarter of 2019.

During the third quarter, seven temporary wells were installed to fill monitoring network data gaps north of the HFBR. The maximum Sr-90 concentration was 0.9 pCi/L in BGRR GP-162. The location of the temporary wells and the results are shown on Figure 17-3 and Table 17-7, respectively.

Planned Operational Changes

- Continue operating wells SR-1, SR-2, SR-3 and SR-9 in full time mode, and maintain wells SR-4, SR-5, SR-6 and SR-7 in standby mode. If significant rebound occurs, place these extraction wells back in full time operation. Sr-90 concentrations in SR-4, SR-5, and SR-6 have remained below the drinking water standard since May 2016.
- Maintain SR-8 in pulsed pumping mode (one month on and one month off) based on low but slightly increasing Sr-90 concentrations since August 2018.
- Continue to supplement the current monitoring network with temporary well data to get a comprehensive status of the plumes and account for well network gaps and groundwater flow related plume shifts. Areas of focus include:
    - Install remaining temporary wells to fill in monitoring network data gaps north of the HFBR and just south of the WCF.
    - Install a temporary well downgradient of BGRR sentinel well 085-403 to re-establish the location of the leading edge of the plume.

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BROOKHAVEN NATIONAL LABORATORY

ENVIRONMENTAL PROTECTION DIVISION

TITLE:

OU III BGRR/WCF

SITEWIDE REMEDIATION SYSTEMS THIRD QUARTER 2019 OPERATIONS REPORT

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
JEB	–	03/15/13	
CHKD:	APPD:	REV.:	NOTES:
JEB	BH	11/18/19	
FIGURE NO.:		17–3	

Table 17-3
OU III Strontium-90 BGRR/WCF Monitoring Well Data
'Hits Only' July through September 2019

Site ID : 075-664

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/08/2019	135	0.451	1.78	PCI/L	66.00	

Site ID : 075-701

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/13/2019	416	0.756	7.92	PCI/L	56.93	
Strontium-90	08/07/2019	289	0.756	2.68	PCI/L	57.97	
Strontium-90	09/11/2019	457	0.721	6.7	PCI/L	58.76	

Table 17-4
OU III Strontium-90 BGRR/WCF Extraction Well Data
'Hits Only' July through September 2019

Site ID : 065-368 (SR-1)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/09/2019	21	0.43	0.733	PCI/L	0.00	
Strontium-90	08/06/2019	30	0.827	1	PCI/L	0.00	
Strontium-90	09/05/2019	26.9	0.759	1.6	PCI/L	0.00	

Site ID : 065-369 (SR-2)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/09/2019	6.36	0.691	0.56	PCI/L	0.00	
Strontium-90	08/06/2019	11.1	0.778	0.691	PCI/L	0.00	
Strontium-90	09/05/2019	11.1	0.756	1.09	PCI/L	0.00	

Site ID : 065-403 (SR-6)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/09/2019	1.42	0.573	0.382	PCI/L	0.00	
Tritium	07/09/2019	597	421	277	PCI/L	0.00	

Site ID : 075-676 (SR-3)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/09/2019	9.01	0.323	0.452	PCI/L	0.00	
Strontium-90	08/06/2019	10.7	0.552	0.6	PCI/L	0.00	
Strontium-90	09/05/2019	14.7	0.777	1.27	PCI/L	0.00	

Site ID : 075-678 (SR-5)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/09/2019	1.47	0.466	0.322	PCI/L	0.00	

Site ID : 075-702 (SR-7)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/09/2019	4.5	0.571	0.451	PCI/L	0.00	

Site ID : 075-703 (SR-8)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/09/2019	4.45	0.633	0.5	PCI/L	0.00	
Tritium	07/09/2019	822	402	281	PCI/L	0.00	
Strontium-90	09/05/2019	8.54	0.787	1.03	PCI/L	0.00	
Tritium	09/05/2019	692	390	263	PCI/L	0.00	

Site ID : 075-704 (SR-9)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Strontium-90	07/09/2019	7.69	0.45	0.509	PCI/L	0.00	
Strontium-90	08/06/2019	18.4	0.474	0.717	PCI/L	0.00	

Table 17-4
OU III Strontium-90 BGRR/WCF Extraction Well Data
'Hits Only' July through September 2019

Site ID : 075-704 (SR-9)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
Tritium	08/06/2019	491	417	265	PCI/L	0.00	J
Strontium-90	09/05/2019	6.22	0.777	0.866	PCI/L	0.00	
Tritium	09/05/2019	489	431	271	PCI/L	0.00	J

Table 17-5
OU III Strontium-90 BGRR/WCF Influent Data
'Hits Only' July through September 2019

Site ID : 066-216 (Combined Influent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/09/2019	0.21	0.5	--	UG/L	0.00	J
524.2 TVOC	07/09/2019	0.4	--	--	UG/L	0.00	
Ethene, 1,2-dichloro-, (E)-	07/09/2019	0.19	0.5	--	UG/L	0.00	J
Strontium-90	07/09/2019	21.1	0.653	0.816	PCI/L	0.00	
1,1,1-Trichloroethane	08/06/2019	0.34	0.5	--	UG/L	0.00	J
524.2 TVOC	08/06/2019	0.98	--	--	UG/L	0.00	
Ethene, 1,2-dichloro-, (E)-	08/06/2019	0.43	0.5	--	UG/L	0.00	J
Strontium-90	08/06/2019	16.5	0.577	0.703	PCI/L	0.00	
Trichloroethylene	08/06/2019	0.21	0.5	--	UG/L	0.00	J
1,1,1-Trichloroethane	09/05/2019	0.32	0.5	--	UG/L	0.00	J
524.2 TVOC	09/05/2019	0.68	--	--	UG/L	0.00	
Ethene, 1,2-dichloro-, (E)-	09/05/2019	0.36	0.5	--	UG/L	0.00	J
Strontium-90	09/05/2019	13.4	0.777	1.23	PCI/L	0.00	
Tritium	09/05/2019	442	400	253	PCI/L	0.00	J

Table 17-6
OU III Strontium-90 BGRR/WCF Effluent Data
'Hits Only' July through September 2019

Site ID : 066-219 (System Effluent)

Chemical	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
1,1,1-Trichloroethane	07/09/2019	0.22	0.5	--	UG/L	0.00	J
524.2 TVOC	07/09/2019	0.68	--	--	UG/L	0.00	
Ethene, 1,2-dichloro-, (E)-	07/09/2019	0.46	0.5	--	UG/L	0.00	J
1,1,1-Trichloroethane	08/06/2019	0.41	0.5	--	UG/L	0.00	J
524.2 TVOC	08/06/2019	1.03	--	--	UG/L	0.00	
Ethene, 1,2-dichloro-, (E)-	08/06/2019	0.45	0.5	--	UG/L	0.00	J
Strontium-90	08/06/2019	2.17	0.597	0.418	PCI/L	0.00	
Trichloroethylene	08/06/2019	0.17	0.5	--	UG/L	0.00	J
1,1,1-Trichloroethane	09/05/2019	0.31	0.5	--	UG/L	0.00	J
524.2 TVOC	09/05/2019	0.67	--	--	UG/L	0.00	
Ethene, 1,2-dichloro-, (E)-	09/05/2019	0.36	0.5	--	UG/L	0.00	J
Strontium-90	09/05/2019	2.41	0.767	0.63	PCI/L	0.00	

Qualifiers :

J = Estimated value.
D = Compound was identified in an analysis at a secondary dilution factor.

Organic Compounds :

B = Compound was found in both the sample And associated laboratory blank.

Inorganic Compounds :

B = Result Is between instrument detection limit And contract required reporting limit.

Table 17-7
OU III Strontium-90 BGRR/WCF Temporary Well Data
July through September 2019

Site ID : BGRR-GP-162

Chemical Name	Sample Date	Value	Detlim	Error	Units	Depth	Qual
Strontium-90	10/1/2019	-0.134	0.784	0.418	PCI/L	62	U
Strontium-90	10/1/2019	0.663	0.674	0.445	PCI/L	66	U
Strontium-90	10/1/2019	0.488	0.77	0.471	PCI/L	70	U
Strontium-90	10/1/2019	0.502	0.729	0.45	PCI/L	74	U
Strontium-90	10/1/2019	0.866	0.392	0.289	PCI/L	78	
Strontium-90	10/1/2019	0.639	0.704	0.45	PCI/L	82	U
Strontium-90	10/1/2019	0.218	0.633	0.361	PCI/L	86	U
Strontium-90	10/1/2019	-0.0366	0.777	0.41	PCI/L	90	U
Strontium-90	10/1/2019	0.193	0.785	0.437	PCI/L	94	U
Strontium-90	10/1/2019	0.0487	0.775	0.413	PCI/L	98	U
Strontium-90	10/1/2019	-0.241	0.775	0.381	PCI/L	102	U
Strontium-90	10/1/2019	-0.0917	0.695	0.351	PCI/L	106	U
Strontium-90	10/1/2019	0.221	0.756	0.426	PCI/L	110	U
Strontium-90	10/1/2019	0.353	0.786	0.461	PCI/L	114	U
Strontium-90	9/30/2019	0.472	0.784	0.472	PCI/L	118	U
Strontium-90	9/30/2019	0.137	0.761	0.422	PCI/L	122	U
Strontium-90	9/30/2019	-0.0194	0.757	0.397	PCI/L	126	U
Strontium-90	9/30/2019	0.0743	0.785	0.431	PCI/L	130	U

Site ID : BGRR-GP-163

Chemical Name	Sample Date	Value	Detlim	Error	Units	Depth	Qual
Strontium-90	9/30/2019	0.443	0.765	0.46	PCI/L	62	U
Strontium-90	9/30/2019	-0.319	0.555	0.312	PCI/L	66	U
Strontium-90	9/30/2019	0.163	0.771	0.437	PCI/L	70	U
Strontium-90	9/30/2019	-0.206	0.776	0.401	PCI/L	74	U
Strontium-90	9/30/2019	-0.231	0.619	0.354	PCI/L	78	U
Strontium-90	9/27/2019	0.083	0.448	0.261	PCI/L	82	U
Strontium-90	9/27/2019	-0.179	0.448	0.251	PCI/L	86	U
Strontium-90	9/27/2019	0.197	0.788	0.448	PCI/L	90	U
Strontium-90	9/27/2019	0.0698	0.297	0.173	PCI/L	94	U
Strontium-90	9/27/2019	-0.0492	0.757	0.401	PCI/L	98	U
Strontium-90	9/27/2019	-0.207	0.492	0.277	PCI/L	102	U
Strontium-90	9/27/2019	-0.303	0.589	0.33	PCI/L	106	U
Strontium-90	9/27/2019	0.118	0.437	0.256	PCI/L	110	U
Strontium-90	9/27/2019	0.202	0.373	0.222	PCI/L	114	U
Strontium-90	9/27/2019	-0.179	0.788	0.393	PCI/L	118	U
Strontium-90	9/27/2019	-0.202	0.504	0.284	PCI/L	122	U
Strontium-90	9/27/2019	0.281	0.37	0.224	PCI/L	126	U
Strontium-90	9/27/2019	0.133	0.442	0.259	PCI/L	130	U

Table 17-7
OU III Strontium-90 BGRR/WCF Temporary Well Data
July through September 2019

Site ID : BGRR-GP-164

Chemical Name	Sample Date	Value	Detlim	Error	Units	Depth	Qual
Strontium-90	9/26/2019	-0.146	0.786	0.408	PCI/L	62	U
Strontium-90	9/26/2019	0.177	0.788	0.452	PCI/L	66	U
Strontium-90	9/26/2019	-0.108	0.779	0.413	PCI/L	70	U
Strontium-90	9/26/2019	0.656	0.781	0.485	PCI/L	74	U
Strontium-90	9/26/2019	-0.0131	0.757	0.409	PCI/L	78	U
Strontium-90	9/26/2019	0.589	0.793	0.486	PCI/L	82	U
Strontium-90	9/25/2019	-0.547	0.785	0.38	PCI/L	86	U
Strontium-90	9/25/2019	0.0527	0.783	0.433	PCI/L	90	U
Strontium-90	9/25/2019	-0.177	0.778	0.422	PCI/L	94	U
Strontium-90	9/25/2019	-0.21	0.696	0.337	PCI/L	98	U
Strontium-90	9/25/2019	-0.237	0.788	0.418	PCI/L	102	U
Strontium-90	9/25/2019	-0.291	0.78	0.405	PCI/L	106	U
Strontium-90	9/25/2019	-0.27	0.789	0.405	PCI/L	110	U
Strontium-90	9/25/2019	0.0882	0.768	0.416	PCI/L	114	U
Strontium-90	9/25/2019	0.236	0.789	0.459	PCI/L	118	U
Strontium-90	9/25/2019	-0.514	0.791	0.374	PCI/L	122	U
Strontium-90	9/25/2019	0.257	0.747	0.426	PCI/L	126	U
Strontium-90	9/25/2019	-0.407	0.788	0.419	PCI/L	130	U

Site ID : BGRR-GP-165

Chemical Name	Sample Date	Value	Detlim	Error	Units	Depth	Qual
Strontium-90	9/24/2019	-0.352	0.788	0.411	PCI/L	62	U
Strontium-90	9/24/2019	0.0735	0.781	0.431	PCI/L	66	U
Strontium-90	9/24/2019	0.037	0.777	0.434	PCI/L	70	U
Strontium-90	9/24/2019	0.233	0.786	0.457	PCI/L	74	U
Strontium-90	9/24/2019	-0.272	0.793	0.367	PCI/L	78	U
Strontium-90	9/24/2019	-0.259	0.782	0.385	PCI/L	82	U
Strontium-90	9/24/2019	-0.335	0.772	0.343	PCI/L	86	U
Strontium-90	9/24/2019	-0.0807	0.744	0.37	PCI/L	90	U
Strontium-90	9/24/2019	0.348	0.787	0.466	PCI/L	94	U
Strontium-90	9/24/2019	0.104	0.789	0.441	PCI/L	98	U
Strontium-90	9/24/2019	0.0787	0.74	0.401	PCI/L	102	U
Strontium-90	9/23/2019	-0.51	0.774	0.393	PCI/L	106	U
Strontium-90	9/23/2019	-0.231	0.764	0.357	PCI/L	110	U
Strontium-90	9/23/2019	-0.0593	0.782	0.434	PCI/L	114	U
Strontium-90	9/23/2019	0.0208	0.794	0.425	PCI/L	118	U
Strontium-90	9/23/2019	0.308	0.766	0.443	PCI/L	122	U
Strontium-90	9/23/2019	-0.0629	0.676	0.34	PCI/L	126	U
Strontium-90	9/23/2019	-0.268	0.769	0.411	PCI/L	130	U

Table 17-7
OU III Strontium-90 BGRR/WCF Temporary Well Data
July through September 2019

Site ID : BGRR-GP-166

Chemical Name	Sample Date	Value	Detlim	Error	Units	Depth	Qual
Strontium-90	9/20/2019	-0.352	0.754	0.347	PCI/L	62	U
Strontium-90	9/20/2019	0.129	0.773	0.429	PCI/L	66	U
Strontium-90	9/20/2019	0.453	0.769	0.461	PCI/L	70	U
Strontium-90	9/20/2019	0.436	0.794	0.475	PCI/L	74	U
Strontium-90	9/20/2019	0.384	0.783	0.465	PCI/L	78	U
Strontium-90	9/20/2019	0.354	0.777	0.456	PCI/L	82	U
Strontium-90	9/20/2019	0.202	0.793	0.458	PCI/L	86	U
Strontium-90	9/20/2019	0.371	0.783	0.463	PCI/L	90	U
Strontium-90	9/20/2019	0.295	0.776	0.454	PCI/L	94	U
Strontium-90	9/20/2019	-0.115	0.669	0.342	PCI/L	98	U
Strontium-90	9/19/2019	0.0296	0.77	0.414	PCI/L	102	U
Strontium-90	9/19/2019	-0.233	0.765	0.389	PCI/L	106	U
Strontium-90	9/19/2019	0.372	0.783	0.462	PCI/L	110	U
Strontium-90	9/19/2019	-0.18	0.501	0.234	PCI/L	114	U
Strontium-90	9/19/2019	0.089	0.54	0.294	PCI/L	118	U
Strontium-90	9/19/2019	0.18	0.784	0.446	PCI/L	122	U
Strontium-90	9/19/2019	-0.448	0.792	0.363	PCI/L	126	U
Strontium-90	9/19/2019	0.0175	0.772	0.406	PCI/L	130	U

Site ID : BGRR-GP-167

Chemical Name	Sample Date	Value	Detlim	Error	Units	Depth	Qual
Strontium-90	9/18/2019	-0.00691	0.717	0.386	PCI/L	62	U
Strontium-90	9/18/2019	-0.204	0.771	0.401	PCI/L	66	U
Strontium-90	9/18/2019	-0.167	0.697	0.359	PCI/L	70	U
Strontium-90	9/18/2019	-0.504	0.787	0.372	PCI/L	74	U
Strontium-90	9/18/2019	0.601	0.678	0.426	PCI/L	78	U
Strontium-90	9/18/2019	-0.104	0.771	0.41	PCI/L	82	U
Strontium-90	9/18/2019	0.0772	0.783	0.43	PCI/L	86	U
Strontium-90	9/18/2019	-0.278	0.763	0.375	PCI/L	90	U
Strontium-90	9/18/2019	-0.461	0.789	0.397	PCI/L	94	U
Strontium-90	9/18/2019	-0.0347	0.779	0.409	PCI/L	98	U
Strontium-90	9/18/2019	-0.407	0.763	0.379	PCI/L	102	U
Strontium-90	9/18/2019	-0.386	0.777	0.4	PCI/L	106	U
Strontium-90	9/17/2019	0.15	0.767	0.431	PCI/L	110	U
Strontium-90	9/17/2019	0.00853	0.784	0.448	PCI/L	114	U
Strontium-90	9/17/2019	-0.062	0.779	0.421	PCI/L	118	U
Strontium-90	9/17/2019	-0.204	0.764	0.411	PCI/L	122	U
Strontium-90	9/17/2019	-0.0344	0.728	0.38	PCI/L	126	U

Table 17-7

OU III Strontium-90 BGRR/WCF Temporary Well Data

July through September 2019

Site ID : BGRR-GP-168

Chemical Name	Sample Date	Value	Detlim	Error	Units	Depth	Qual
Strontium-90	9/16/2019	0.56	0.784	0.474	PCI/L	62	U
Strontium-90	9/16/2019	-0.151	0.786	0.435	PCI/L	66	U
Strontium-90	9/16/2019	-0.134	0.784	0.429	PCI/L	70	U
Strontium-90	9/16/2019	0.0226	0.782	0.422	PCI/L	74	U
Strontium-90	9/16/2019	-0.185	0.756	0.379	PCI/L	78	U
Strontium-90	9/16/2019	0.178	0.79	0.454	PCI/L	82	U
Strontium-90	9/16/2019	0.285	0.768	0.449	PCI/L	86	U
Strontium-90	9/16/2019	-0.106	0.761	0.391	PCI/L	90	U
Strontium-90	9/16/2019	-0.222	0.774	0.414	PCI/L	94	U
Strontium-90	9/16/2019	0.105	0.766	0.432	PCI/L	98	U
Strontium-90	9/16/2019	0.0846	0.784	0.438	PCI/L	102	U
Strontium-90	9/16/2019	-0.199	0.76	0.376	PCI/L	106	U
Strontium-90	9/16/2019	-0.238	0.775	0.428	PCI/L	110	U
Strontium-90	9/16/2019	0.0376	0.789	0.45	PCI/L	114	U
Strontium-90	9/12/2019	0.54	0.792	0.484	PCI/L	118	U
Strontium-90	9/12/2019	0.146	0.773	0.444	PCI/L	122	U
Strontium-90	9/12/2019	-0.226	0.782	0.36	PCI/L	126	U
Strontium-90	9/12/2019	0.101	0.777	0.421	PCI/L	130	U

U = Not detected

Section 18

Q-3 2019 Quarterly Monitoring Summary
g-2 Source Area and Tritium Plume

1.0 Background

In November 1999, tritium was detected in the groundwater near the g-2 experiment at concentrations above the 20,000 pCi/L maximum contaminant level (MCL). Sodium-22 was also detected in the groundwater, but at concentrations well below the 400 pCi/L MCL. An investigation into the source of the contamination revealed that the tritium and sodium-22 originated from activated soil shielding located adjacent to the g-2 target building. Rainwater was able to infiltrate the activated soils and carry the tritium and sodium-22 into the groundwater. To prevent additional rainwater infiltration into the activated soil shielding, a concrete cap was constructed over the soil shielding in December 1999.

Following the concurrence of the NYSDEC, a Record of Decision (ROD) was signed by the U.S. DOE and U.S. EPA in early 2007. This ROD requires continued routine inspection and maintenance of the impermeable cap, groundwater monitoring of the source area to verify the continued effectiveness of the storm water controls and monitoring the tritium plume until it attenuates to less than the 20,000 pCi/L MCL.

2.0 Monitoring Activities

Surveillance of groundwater quality is accomplished using five wells located immediately downgradient of the source area, and 10 wells located further downgradient, southeast of AGS facility Building 912. The monitoring frequency for five wells located immediately downgradient of the source area wells is semi-annual, with samples collected during the 2nd and 4th quarters of the year. The 10 wells located downgradient of Building 912 are sampled during the 4th quarter.

Source Area Monitoring Results:

No samples were collected during the 3rd Quarter. During the 2nd Quarter sampling period, the maximum tritium concentration in source area monitoring wells was 3,070 pCi/L in well 054-185 (Figure 18-1). The overall reductions in tritium concentrations observed in source area monitoring wells indicate that the cap is effectively preventing rainwater infiltration into the activated soil shielding and the amount of residual tritium that is available to be flushed out of the deep vadose zone is decreasing.

3.0 Recommendations

- Continue to sample the five monitoring wells directly downgradient of the source area (near Building 912A) semiannually (2nd and 4th Quarters), and the 10 wells located near Building 912 annually (4th Quarter).
- Continue scheduled inspections and perform required maintenance of the g-2 cap.
- Monitoring results will be communicated to the regulatory agencies via quarterly and annual reports.

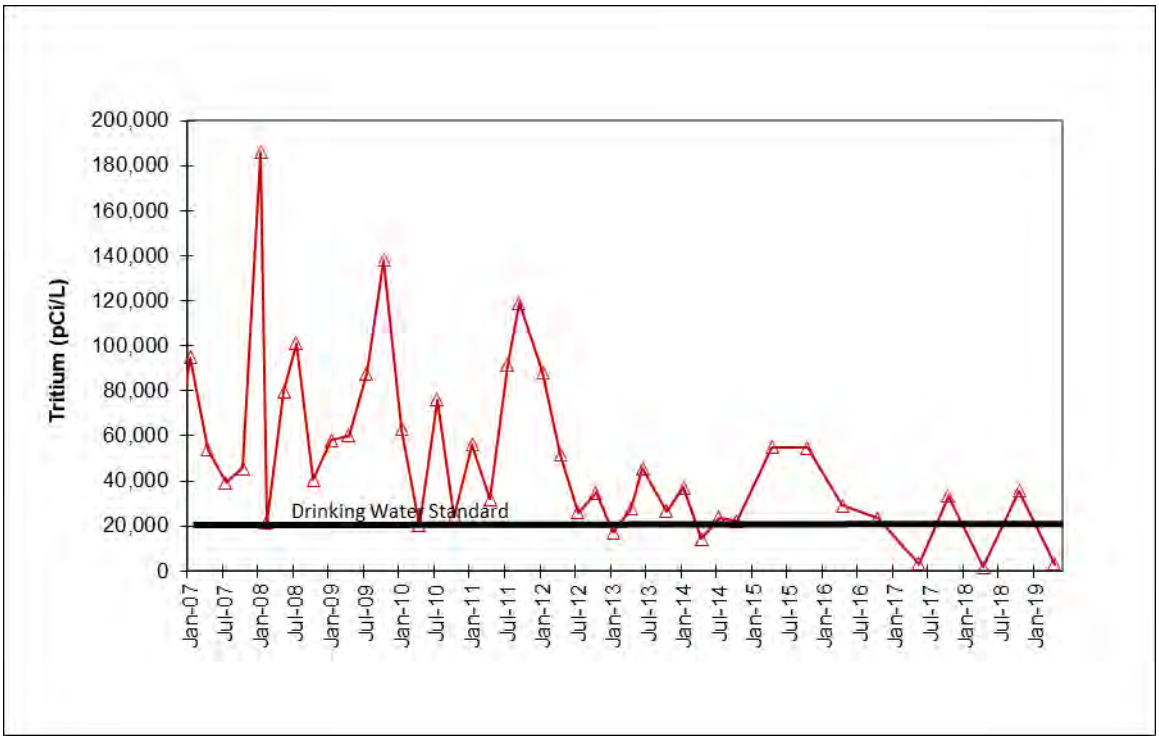


Figure 18-1. Maximum tritium concentrations observed from January 2007 through April 2019 in groundwater downgradient of the g-2 source area.

Section 19

Q-3 2019 Quarterly Monitoring Summary
BLIP Source Area

1.0 Background

The Brookhaven Linac Isotope Producer (BLIP) is an active accelerator facility located in the central portion of the site. The BLIP facility has been in operation since 1972 and is a national resource for producing the radioisotopes that are crucial in nuclear medicine for both research and clinical use. BLIP also supports BNL's research on diagnostic and therapeutic radiopharmaceuticals.

Beam line operations have resulted in the activation of soils that surround the BLIP target vessel. These activated soils are approximately 30 feet below the BLIP building, in a small zone surrounding the target vessel. In 1998, low levels of tritium were detected in the groundwater near the BLIP facility experiment at concentrations of approximately three times the 20,000 pCi/L MCL. Sodium-22 was also detected in the groundwater, but the levels were less than the 400 pCi/L MCL. A number of corrective actions were implemented in 1998 to prevent additional rainwater from entering the activated soil. These included repairing and reconfiguring the building's roof gutters and downspouts, resealing the paved areas south of the building, and installing a concrete cap in the remaining areas around the building. In 2000, a colloidal silica grout was injected into the activated soil to further immobilize the tritium and sodium-22, and in 2004 an additional impermeable cap was constructed over the beam line that runs from the Linac to the BLIP facility.

Following the concurrence of the NYSDEC, a Record of Decision (ROD) was signed by the U.S. DOE and U.S. EPA in early 2007. This ROD requires continued routine inspection and maintenance of the impermeable cap and groundwater monitoring to verify the continued effectiveness of the storm water controls.

2.0 Monitoring Activities

Three groundwater monitoring wells are positioned immediately downgradient of the BLIP facility. The wells are currently monitored on a semi-annual basis (during the 2nd and 4th Quarters).

Monitoring Results:

No samples were collected during the 3rd Quarter. During the 2nd Quarter sample period, tritium was detected in downgradient well 064-48 at a concentration of 5,000 pCi/L. Since early 2006, tritium concentrations in the groundwater downgradient of BLIP have been continually less than the 20,000 pCi/L MCL (Figure 19-1). The overall reductions in tritium concentrations observed in the source area wells since 2006 indicate that the cap is effectively preventing rainwater infiltration into the activated soil shielding and the amount of residual tritium that is available to be flushed out of the deep vadose zone is decreasing.

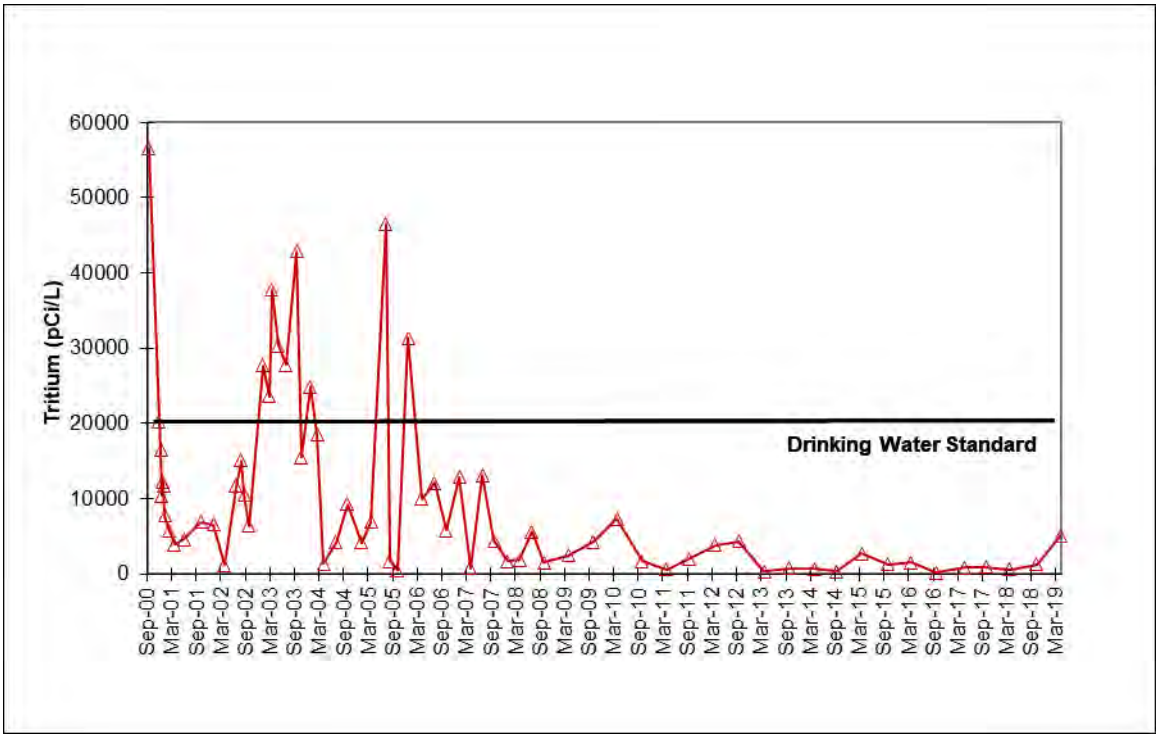


Figure 19-1. Maximum tritium concentrations observed from 2000 through April 2019 in groundwater immediately downgradient of the BLIP Facility.

3.0 Recommendations

The following are recommendations for the BLIP facility:

- Continue monitoring the three wells immediately downgradient of BLIP for tritium on a semiannual basis (2nd and 4th Quarters).
- Continue scheduled inspections and perform required maintenance of the BLIP cap.
- Monitoring results will continue to be communicated to the regulatory agencies via quarterly and annual reports.

Section 20
Q3-2019 Operations Summary
OU III Building 452 Freon-11 Pump & Treat System

Process: Groundwater extraction and air stripping treatment, with discharge to a drainage culvert leading to Recharge Basin HS.

Goal: Remediation of Freon-11 in the groundwater and reach Maximum Contaminant Levels (MCLs) in core monitoring wells within 30 years for the Upper Glacial aquifer (by 2030).

Start Date: March 2012

Table 20-1
OU III Building 452 Freon-11 Pump & Treat System
Pumping Rate (gpm)

Extraction Well	**EW-18**
Site Id #	095-316
Screened Interval (feet below grade)	55-65
Desired Flow Rate (GPM)	0**
July	0**
August	0**
September	0**
Actual (Avg. over Qtr.)	0**

* System began pulsed pumping in February 2015 (one month on and one month off).
**System placed in stand-by mode March 2016 and was temporarily re-started November 2016 through March 2017 due to a rebound in Freon-11 concentrations in EW-18.

Figure 20-1
OU III Building 452 Freon-11 Pump & Treat System
Cumulative Mass Removal of Trichlorofluoromethane vs. Time

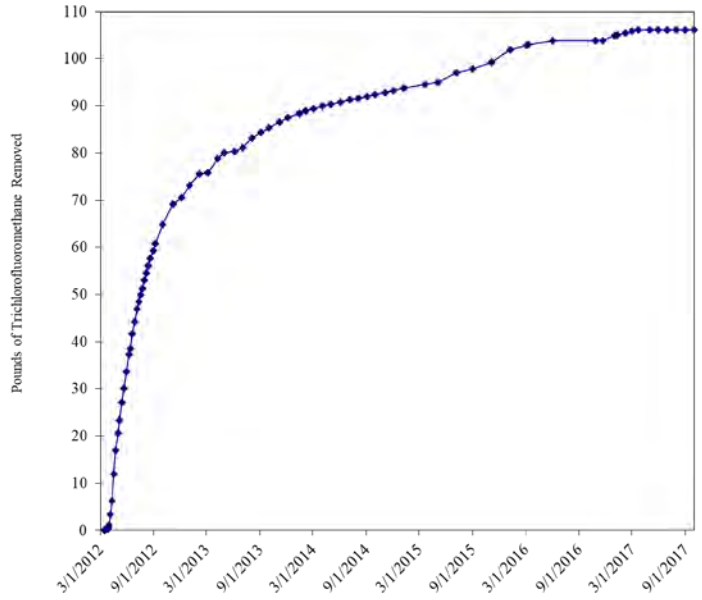


Figure 20-2
OU III Building 452 Freon-11 Pump & Treat System
Influent Trichlorofluoromethane Concentrations vs. Time

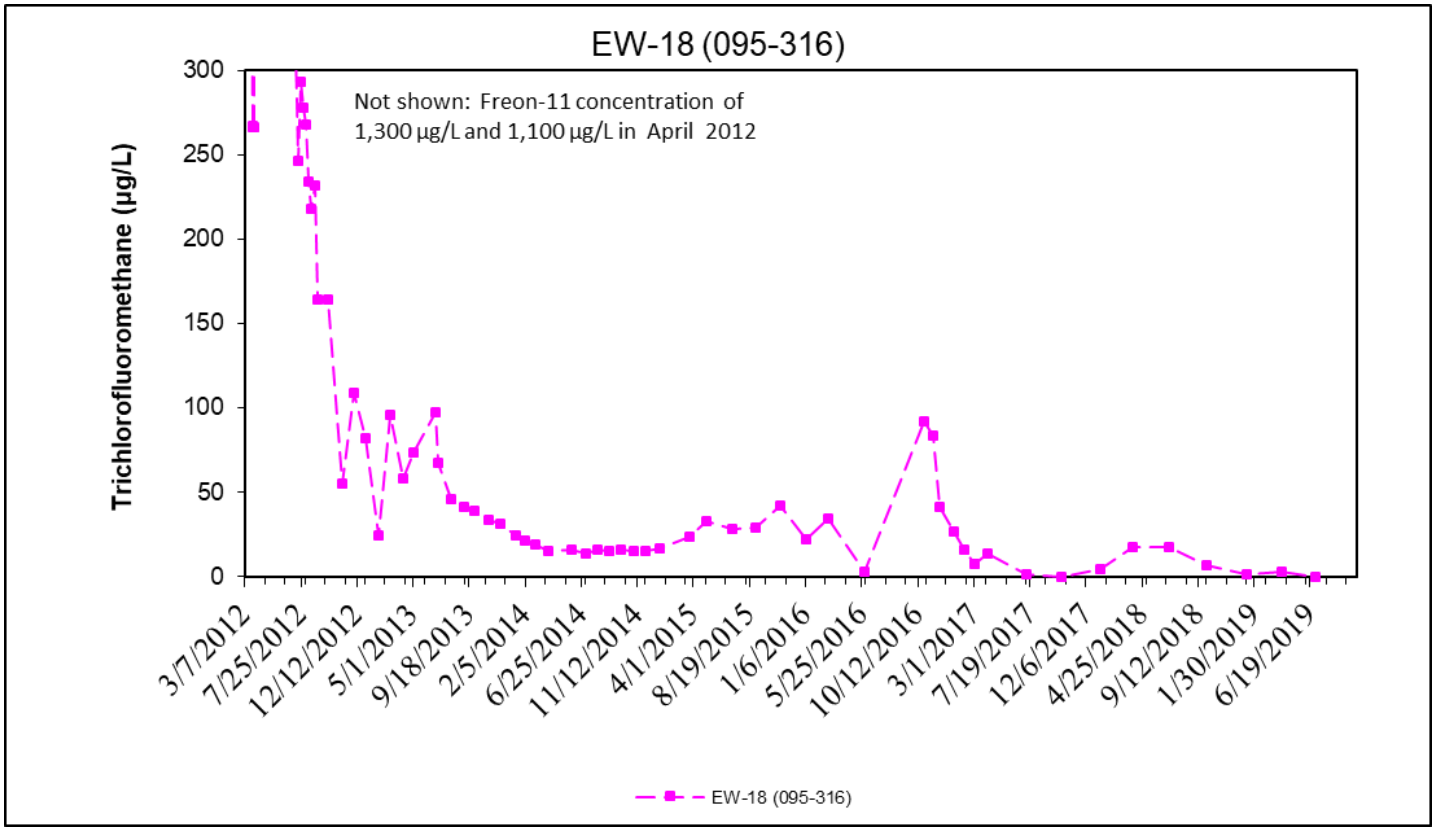


Table 20-2
Effluent Water Quality
SPDES Equivalency Permit Concentrations July 1, 2019 – September 30, 2019

Parameter	Permit Limit	Max. Measured Value	Units	Frequency*
Flow	120	62	GPM	Continuous
pH (range)	5.0 - 8.5	6.3 - 7.7	SU	Weekly
Benzene	1.0	<0.5	ug/L	Monthly
Bromodichloromethane	50	<0.5	ug/L	Monthly
Carbon Tetrachloride	5.0	<0.5	ug/L	Monthly
Chloroform	7.0	<0.5	ug/L	Monthly
Dichlorodifluoromethane	5.0	<0.5	ug/L	Monthly
1,1-Dichloroethylene	5.0	<0.5	ug/L	Monthly
4-Isopropyltoluene	5.0	<0.5	ug/L	Monthly
Methyl Chloride	5.0	<0.5	ug/L	Monthly
Methylene Chloride	5.0	<0.5	ug/L	Monthly
Tetrachloroethylene	5.0	<0.5	ug/L	Monthly
Toluene	5.0	<0.5	ug/L	Monthly
1,2,3-Trichlorobenzene	5.0	<0.5	ug/L	Monthly
1,1,1-Trichloroethane	5.0	<0.5	ug/L	Monthly
Trichlorofluoromethane	5.0	<0.5	ug/L	Monthly
1,2,4-Trimethylbenzene	5.0	<0.5	ug/L	Monthly
Xylene (meta + para)	10.0	<0.5	ug/L	Monthly

Note: Starting in June 2019, the flow from Bldg. 96 RTW-1 was increased to 60 gallons per minute and the water is being treated at the Building 452 Freon-11 treatment system due to the larger capacity of this system. Beginning with the July Discharge Monitoring Report (DMR), the RTW-1 discharge is formally reported under the Freon-11 Equivalency Permit.

System Operations

July 2019:

The system remained in stand-by mode.

August 2019:

The system remained in stand-by mode.

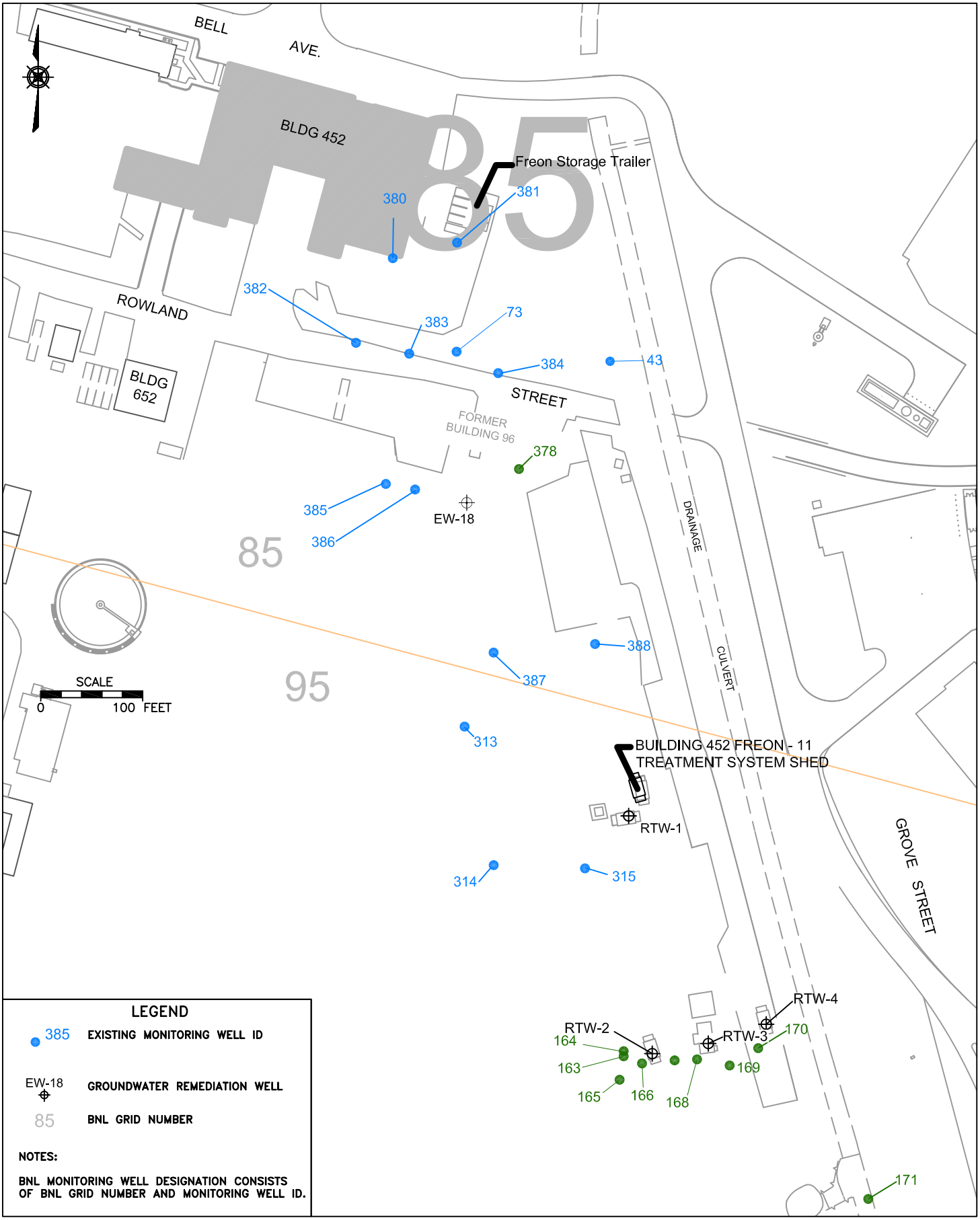
September 2019:

The system remained in stand-by mode.

A Petition for Closure was submitted to the regulators in July 2019. NYSDEC/NYSDOH approval of the Petition was received in August, and EPA comments were received in September.

Planned Operational Changes

- Maintain the Building 452 Treatment System in standby mode. Submit responses to EPA comments on the Petition for Closure to the regulators.
- Maintain full-time operation of the Building 96 treatment well RTW-1. Continue to report the RTW-1 discharge under the Freon-11 equivalency permit discharge monitoring report.
- During the third quarter of 2019, Freon-11 concentrations in extraction well EW-18 were below the NYS AWQS of 5 µg/L. Sampling of the Freon-11 monitoring wells were discontinued in the third quarter 2019.
- Select Freon-11 monitoring wells located downgradient of extraction well EW-18 may be incorporated into the Building 96 program. Any decisions to abandon extraction well EW-18 and the monitoring wells will be made after the PFAS plume originating from the former firehouse area has been fully characterized.



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BROOKHAVEN NATIONAL LABORATORY
ENVIRONMENTAL PROTECTION DIVISION

TITLE:

BUILDING 452 AREA FREON-11 MONITORING WELL NETWORK

SITEWIDE REMEDIATION SYSTEMS
THIRD QUARTER 2019 OPERATIONS REPORT

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
AJZ	–	08/24/12	
CHKD:	APPD:	REV.:	NOTES:
JEB	RH	11/18/19	RH Rev

FIGURE NO.: 20-3

Table 20-3
OU III Freon Influent Data
"Hits Only" - July through September 2019

Site ID : 095-316 (EW-18)

Chemical Name	Sample Date	Value	Det. Limit	Error	Units	Depth	Qual
524.2 TVOC	07/03/2019	1.25	--	--	UG/L	0.00	
Chloroform	07/03/2019	1.25	0.5	--	UG/L	0.00	